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## DEPARTMENT OF HIGHWAYS

# 1975 REVISIONS TO 1974 STANDARD DRAWING BOOK FOR ROAD AND BRIDGE CONSTRUCTION

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February 1, 1975

STANDARD DRAWING BOOK

We are sending the following additions and/or revisions effective February 1, 1975 to be included in your present Standard Drawing Book, the yellow covered one, original issue July 1, 1974.

| Standard Drawing No. | Standard Drawing No. |
|---|---|
| 15 | 212 |
| 18 | 213 |
| 19 | 219 |
| 44 | 220 |
| 46 | 223 |
| 47 | 224 |
| 57 | 227 |
| 66 | 228 |
| 67 | 232 |
| 77 | 233 |
| 78 | 234 |
| 84 | 236 |
| 85 | 237 |
| 88 | 241 |
| 203 | 242 |
| 204 | 244 |
| 205 | 245 |
| 207 | 251 |
| 208 | 256 |
| 210 | |
| 211 | |

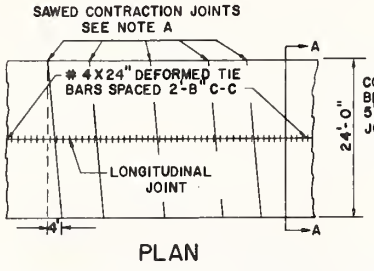
Note:
1. Add these drawings to your book
2. We are also sending a new index page no. 4
   You should destroy the old index page no. 4
3. Standard Drawing No. 77 has been deleted effective January 1, 1975.

Stephen C. Kologi

Stephen C. Kologi, P. E., Chief
Preconstruction Bureau

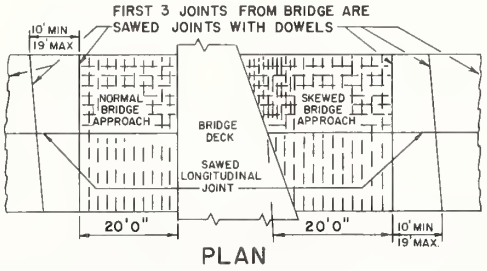
| Standard Drawing Title & Section Heading | Reference Number To Standard Specifications Sections | Drawing Number |
|---|---|---|
| FENCE AND CATTLE GUARD | | |
| Wire Fence - Interstate Type | 81 | 75 |
| Chain Link Fence | 80 | 76 |
| Median Barrier Fence - Deleted February 1, 1975 - | 80 | 77 |
| Farm Fence | 81 | 78 |
| Cattle Guard | 82 | 79 |
| GUARD RAIL | | |
| Concrete Median Rail | 90 | 84 |
| Metal Guard and Median Rail | 90 | 85 |
| Bridge End Treatment | 90 | 86 |
| Pier Treatment | 90 | 87 |
| Guardrail for Grade Crossing Protection | 90 | 88 |
| Guardrail Terminal Sections | 90 | 89 |
| Cable Guard Rail | 90 | 90 |
| Cable Guard Rail Driveway Anchor Section | 90 | 91 |
| MISCELLANEOUS STANDARDS | | |
| Slope Rounding | 11 | 100 |
| Roadway Embankment at Bridge End | 11 | 101 |
| U-Turn Median Openings on Controlled Access Highways | 11 | 102 |
| Approaches | 20 | 103 |
| Monuments and Markers | 96 | 104 |

# 8" X 24' PLAIN P.C. CONCRETE PAVEMENT




PLAN

NOTE C:
CONTRACTION JOINTS SHALL BE CONSTRUCTED AT LEAST 5' FROM ANY CONSTRUCTION JOINT (STD. DWG. #17)




PLAN

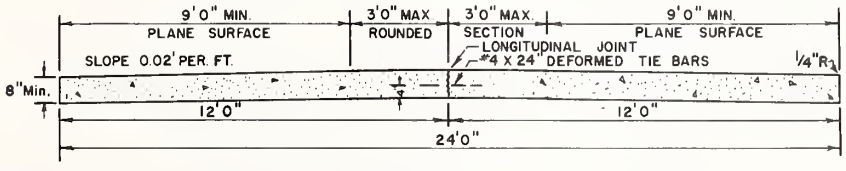
NOTE A: CONTRACTION JOINTS SHALL BE SAWED DIAGONALLY AS SHOWN ABOVE UNLESS SHOWN OTHERWISE ON THE PLANS.

OFFSET = 4' IN 24' AND SKEWED COUNTERCLOCKWISE TO THE DIRECTION OF TRAFFIC MOVEMENT.

SPACING OF THE JOINTS SHALL BE 13', 19', 18', 12' AND REPEAT EXCEPT FOR THE FIRST JOINT AT BRIDGE APPROACH PANELS OR EXPANSION JOINT LAYOUT.

SAWED JOINT DETAIL FOR BRIDGE APPROACH PANELS

NOTE B: THE 10' MIN AND 19' MAX. DIMENSIONS SHOWN ABOVE ARE ALSO APPLICABLE FOR THE FIRST CONTRACTION JOINT ON EITHER SIDE OF AND EXPANSION JOINT LAYOUT.



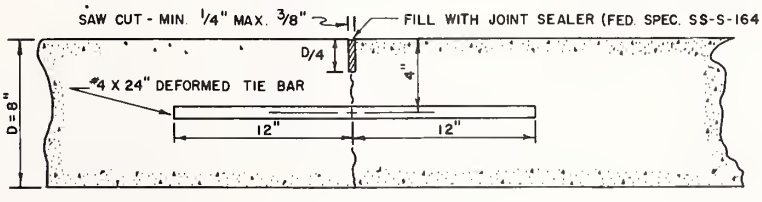

SECTION A-A

FOR CONTRACTION JOINT DETAIL

FOR LOCATION AND DETAILS OF DOWELED CONTRACTION JOINTS

DEFORMED TIE BARS TO BE INCLUDED IN UNIT PRICE BID FOR P.C. CONCRETE PAVEMENT.

## SAWED LONGITUDINAL JOINT WITH DEFORMED TIE BARS




MAXIMUM SPACING OF TIE BARS 2'6" C-C.

TIE BARS MAY BE INSTALLED AFTER THE CONCRETE HAS BEEN STRUCK OFF AND PRIOR TO FINAL FINISHING, BY AN INSTALLING DEVICE, PREVIOUSLY APPROVED BY THE ENGINEER, WHICH WILL PLACE THE TIE BARS IN THE REQUIRED POSITIONS AND LOCATION.

TIE BARS PLACED IN ADVANCE OF CONCRETE PLACING OPERATIONS SHALL BE RIGIDLY AND SECURELY SUPPORTED IN THE REQUIRED POSITION AT THE JOINT BY CHAIRS, STAKES AND OR SUPPORTING DEVICES. THE SUPPORTING DEVICES MAY BE FACTORY ASSEMBLED. THE CONTRACTOR SHALL FURNISH THE ENGINEER WITH DETAIL DRAWING OF THESE DEVICES, A SUFFICIENT TIME IN ADVANCE OF CONSTRUCTION, FOR HIS APPROVAL. ANY APPROVAL OF DRAWINGS OF THESE DEVICES SHALL BE CONSIDERED TENTATIVE AND FINAL APPROVAL SHALL BE CONTINGENT UPON THEIR SATISFACTORY PERFORMANCE.

SEE STANDARD SPECIFICATIONS ARTICLE 39.04 (K) (4) FOR SAWED JOINT.

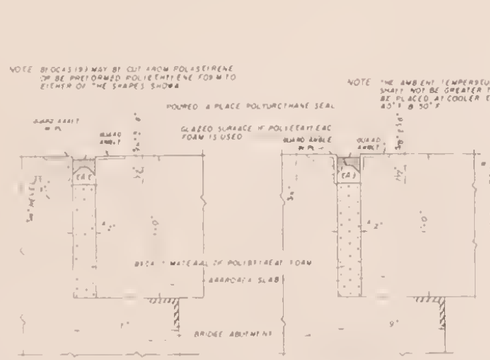
THE COST OF THE TIE BARS, JOINT SEALER, AND SUPPORTING DEVICES SHALL BE INCLUDED IN THE UNIT PRICE BID PER SQUARE YARD OF P.C. CONCRETE PAVEMENT.

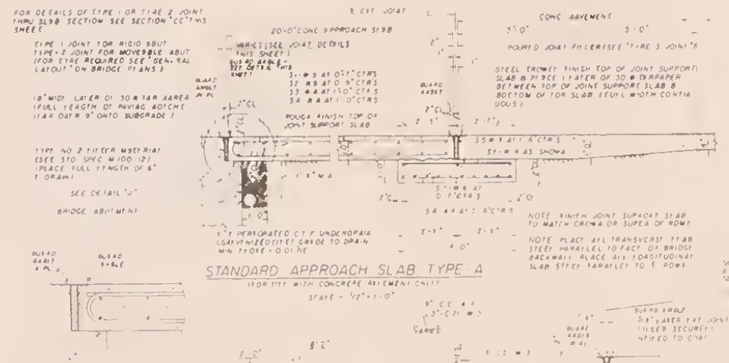
NOTE: THIS JOINT MAY BE USED AT OTHER LOCATIONS IF CALLED FOR ON THE PLANS.

| STANDARD DRAWING | |
|---|---|
| REFERENCE. STANDARD SPEC. SECTION 39 | DWG. NO. 15 |
| 8" P.C. CONCRETE PAVEMENT SAWED JOINTS WITH TIE BARS | |

| | | |
|---|---|---|
| REVISED | | 12/20/74 |
| EFFECTIVE | 3/1/72 | 2/1/75 |

APPROVED: H. J. ANDERSON, DIRECTOR OF HIGHWAYS
BY: Jack R. Hooker
ADMINISTRATOR-ENGINEERING DIVISION


NOTE BLOCKS (B) MAY BE CUT FROM POLYSTYRENE OR BE PREFORMED POLYETHYLENE FOAM TO EITHER OF THE SHAPES SHOWN
NOTE THE AMBIENT TEMPERATURE DURING THE PLACING OF THE SEAL SHALL NOT BE GREATER THAN 70°F AND IF PRACTICABLE IT SHALL BE PLACED AT COOLER TEMPERATURES PREFERABLY BETWEEN 40°F & 50°F
POURED & PLACE POLYURETHANE SEAL
GLAZED SURFACE IF POLYSTYRENE FOAM IS USED
GUARD ANGLE
GUARD RAIL
8" JOINT OPENING AT 60°F ADJUST JOINT FOR TEMPERATURE AT TIME OF PLACING APPROACH SLAB CONC
NOTE IF ONE ADJACENT BLOCK (B) IS USED, PROVIDE A BOND BREAKER MATERIAL BETWEEN CAP AND CAP MOUNTED SEALANT
NOTE (1) THE ADJUSTED SEALANT IS TO BE PLACED AGAINST A METAL SURFACE. THE ADHESION PRIMER MUST BE APPLIED
BITUMINOUS MATERIAL OR POLYSTYRENE FOAM
APPROACH SLAB
BRIDGE ABUTMENT
SEAL DETAIL
SCALE 3"=1'-0"


FOR DETAILS OF TYPE 1 OR TYPE 2 JOINT THRU SLAB SECTION SEE SECTION "CC" THIS SHEET
TYPE 1 JOINT FOR RIGID ABUT TYPE 2 JOINT FOR MOVEABLE ABUT (FOR TYPE REQUIRED SEE "GENERAL LAYOUT" ON BRIDGE PLANS)
20'-0" CONC APPROACH SLAB
GUARD ANGLE
GUARD RAIL
VARIES (SEE JOINT DETAILS THIS SHEET)
BUARD ANGLE SEE DETAIL THIS SHEET
10" MIN. LAYER OF 30 # BAR RABBIT FULL LENGTH OF PAVING NOTCHED LAG OVER 9" ONTO SUBGRADE
TYPE NO 2 FILTER MATERIAL (SEE STD. SPEC M 100-12) PLACE FULL LENGTH OF 6" T. DRAIN
SEE DETAIL "J"
BRIDGE ABUTMENT
6" PERFORATED C.I.P. UNDERDRAIN (LAY WITH HOLES SET GRADE TO DRAIN MIN. 1% OR S = 0.01 FT.)
STANDARD APPROACH SLAB TYPE A
(FOR USE WITH CONCRETE PAVEMENT ONLY)
SCALE - 1/2"=1'-0"
DETAIL "J"
SCALE 1"=1'-0"
GUARD ANGLE REQUIRED FOR TYPE 2 JOINT ONLY
BAR BENDING DETAILS
NO SCALE
CONC PAVEMENT
5'-0"
POURED JOINT FILLER (SEE "TABLE 3 JOINTS")
STEEL TROWEL FINISH TOP OF JOINT SUPPORT SLAB & PROVIDE 1/4" DEPTH OF 30 # BARRIER BETWEEN TOP OF JOINT SUPPORT SLAB & BOTTOM OF TOP SLAB (FULL WIDTH CONTINUOUS)
NOTE: WIDTH JOINT SUPPORT SLAB TO MATCH CROWN OR SUPER OF ROAD
NOTE PLACE ALL TRANSVERSE STEEL PARALLEL TO FACE OF BRIDGE BACKWALL. PLACE ALL LONGITUDINAL SLAB STEEL PARALLEL TO ℄ ROAD
TYPE 1 JOINT
(FOR RIGID ABUT)
SCALE 1"=1'-0"
POLYETHYLENE FOAM TOP TO MAT. GLAZED SURFACE ADD TO BE CROWNED OR LEVEL AS SHOWN (SEE SPECIAL PROVISION B FOR DETAIL THIS SHEET)
TYPE 2 JOINT
(FOR MOVEABLE ABUT)
SCALE 1"=1'-0"
JOINT AT CURB EAD TO BE THE SAME AT THAT BETWEEN ABUT & APPROACH SLAB
6" A PERFORATED C.S.A UNDERDRAIN EXTEND PAST WING TO DAYLIGHT
ASPHALT SHOULDER
2'-6" EA. AT CONC PAVEMENT
ASPHALT SHOULDER
20'-0" SLAB
JOINT
BRIDGE WIDTH (SEE BRIDGE PLANS)
TYPE A
TYPE B
AT SQUARE BRIDGE
CURB END SQUARE TO ℄ ROAD (EXP. BOTH SIDES AT ALL SLABS)
6" A PERFORATED C.I.P. UNDERDRAIN EXTEND PAST WING TO DAYLIGHT
APPROACH SLAB WIDTH=FACE TO FACE OF BRIDGE CURBS+3'-0"
20'-0" SLAB
JOINT
BRIDGE WIDTH (SEE BRIDGE PLANS)
TYPE A
TYPE B
AT SKEWED BRIDGES
PLAN VIEW OF APPROACH SLABS
NO SCALE
NOTE SLAB B CURB THAT BE CURVED OR TAPERED WHEN NECESSARY TO MATCH ROADWAY
20'-0" CONC APPROACH SLAB
VARIES (SEE JOINT DETAILS THIS SHEET)
GUARD ANGLE SEE DETAIL THIS SHEET
STANDARD APPROACH SLAB TYPE B
(FOR USE WITH ASPHALT PAVEMENT ONLY)
SCALE 1"=1'-0"
6" A PERFORATED C.I.P. UNDERDRAIN (SEE DETAIL THIS SHEET)
GUARD ANGLE SEE DETAIL THIS SHEET
ADJUSTED JOINT SEALANT
APPROACH SLAB
POLYSTYRENE
BRIDGE ABUTMENT
TYPE 3 JOINT
(FOR USE OVER JOINT SUPPORT SLAB)
SCALE 1"=1'-0"

## NOTES

APPROACH SLAB (PPROACH TLAB) SHALL BE CONSTRUCTED IN ACCORDANCE WITH A SECTION 41 OF THE STANDARD SPECIFICATION. THE SLAB SHALL BE FINISHED AS SPECIFIED FOR BRIDGE DECKS IN ARTICLE 40.03 OF 51.03 CONCRETE SHALL BE EITHER CLASS "AO" OR CLASS "AA" AT CONTRACTORS OPTION

REINFORCING STEEL REINFORCING STEEL SHALL BE IN ACCORDANCE WITH SECTION 81 OF THE STANDARD SPECIFICATIONS EXCEPT METHOD OF MEASUREMENT AND BASIS OF PAYMENT SHALL BE AS SET FORTH BELOW

FOUNDATION THE FOUNDATION FOR THE APPROACH SLAB AND JOINT SUPPORT SLAB SHALL CONSIST OF THE SUBGRADE AND BASE CONSTRUCTED AND COMPACTED IN ACCORDANCE WITH STANDARD PLANS AND SPECIFICATIONS EXCAVATION FOR JOINT SUPPORT SLAB SHALL BE NOT LESS THAN 2 FEET AND NOT MORE THAN 3 FEET WIDER THAN THE WIDTH OF THE SLAB AND SHALL BE EXCAVATED BUT NOT FILLED WITH CONCRETE SLAB SHALL BE BACKFILLED WITH THE SAME MATERIAL THAT WAS TAKEN FROM THE EXCAVATION ALL BACKFILL SHALL BE LAYER PLACED AND COMPACTED WITH MECHANICAL TAMPERS THE COST OF ALL EXCAVATION NECESSARY FOR THE PLACEMENT OF APPROACH SLAB AND JOINT SUPPORT SLAB SHALL BE INCLUDED IN THE UNIT PRICE BID FOR "CONCRETE APPROACH SLAB" AS SET FORTH BELOW

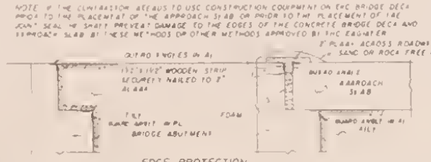
MEASUREMENT & PAYMENT APPROACH SLABS SHALL BE MEASURED BY AREA IN SQ. YDS. THE WIDTH AND LENGTH FOR MEASUREMENT SHALL BE SHOWN OUT TO OUT OF COMPLETED SLAB NO ADDITIONAL AREA WILL BE ALLOWED FOR THE JOINT SUPPORT SLAB THE UNIT PRICE BID PER TON OR PER "CONCRETE APPROACH SLAB" SHALL BE FULL COMPENSATION FOR FURNISHING ALL MATERIAL EQUIPMENT TOOLS AND LABOR NECESSARY TO COMPLETE THE WORK, INCLUDING THE JOINT SUPPORT SLAB AND LUNITED TREATMENT

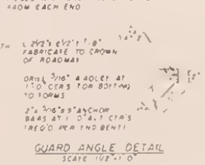
SEAL FOR TYPE AND METHOD OF APPLICATION OF JOINT SEALANTS SEE SPECIAL PROVISIONS

SEALANT POLYURETHANE SEALANTS SHALL MEET FEDERAL SPECIFICATION SS-S-00230 C OR TT-S-00227 E, CLASS A, (EXCEPT SELF LEVELING) AND TYPE 2 NON-SAG, TWO COMPONENT ELASTOMERIC POLYMER TYPE, COLD APPLIED. IN ADDITION TO THE ABOVE, A GUN GRADE SEALANT CONFORMING TO FEDERAL SPECIFICATION SS-S-200 E MAY BE USED & THE TYPE - JOINT USED

| | |
|---|---|
| PACIFIC POLYMERS | W. R. MEADOWS |
| EXPO JOINT SEALANT CO. | CHEM-CALCORP |
| SUPERIOR POLYMER | CHEMSEAL CORP. |
| EMULSITE | W. R. MEADOWS |
| EDUCO (SEALANT PRODUCTS INC) | CHEM-CAL CORP. (MANUFACTURER) |
| EDMO (ATLAS CALIFORNIA) | |

PROTECTIVE COATING ALL APPROACH SLAB AND CURB SHALL BE GIVEN A PROTECTIVE COATING OF BOILED LINSEED OIL SEE STANDARD SPECIFICATION





L 2½"x 6½"x 1"-0" FABRICATE TO CROWN OF ROADWAY
DRILL 3/16" Ø HOLES AT 1'-0" CTRS TOP & BOTTOM TO TOWARD
2"x 2½"x 8'-0" ANCHOR BARS AT 1'-0" CTRS TYPICAL PER END BENT
GUARD ANGLE DETAIL
SCALE 1½"=1'-0"

MARKING CAN BE PAINTED ON THE SEAL AS SHOWN ON THE PLANS

THE SEALANT SHALL BE PLACED WITH THE RANGE IN TEMPERATURE AT THE TIME OF PLACEMENT AS SPECIFIED FOR THE TYPE OF SEALANT FOR MOST SEALANTS CONDITIONS ARE BEST WHEN THE AIR TEMPERATURE IS RISING

A BOND BREAKER MATERIAL MAY BE USED AS SHOWN AT BOTTOM OF SEALANT RESULTING IN A THREE SIDED SEALANT AS NOTED ON THE APPROVED SKETCH

SEALING THE JOINT IMMEDIATELY AFTER PLACING THE SEALANT TO INSURE THAT THE MAXIMUM WIDTH OF THE BRIDGE JOINT AT THE TIME OF PLACING THE SEALANT IS NOT MORE THAN THE MAXIMUM WIDTH OF THE JOINT AT THE TIME OF PLACING THE SEALANT

TAKE THE NECESSARY PRECAUTIONS TO PREVENT ANY MATERIAL FROM SPILLING ONTO THE EXPOSED FACES OF THE CONCRETE

TAPED TREATMENT IN THE EVENT THAT THE USED TAPE TREATMENT IS APPLIED TO THE JOINT AS SHOWN, SUCH THAT THE TAPE WILL NOT BE IN CONTACT WITH THE CONCRETE

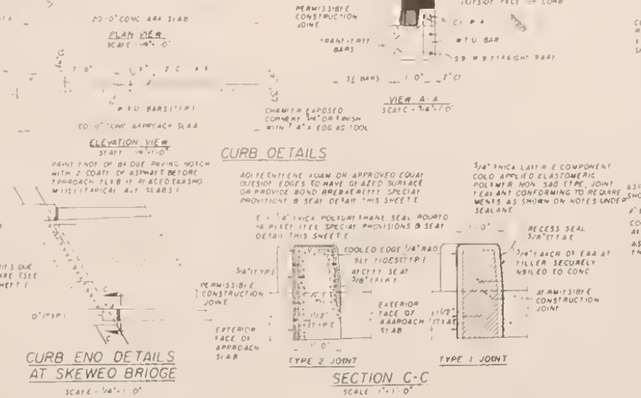
SHOT BLASTING THE AREAS OF PENETRATING CONCRETE SURFACE TO A MINIMUM DEPTH OF 1/16" OF BOTH THE APPROACH SLAB SEAL AND AT THE CONCRETE SURFACE THAT ARE CONTACT WITH THE SEALANT

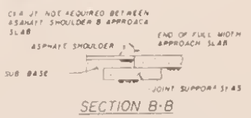
PAINT ONE OR MORE COATS OF ASPHALT BEFORE PLACING THE SEALANT

PRIMING MOST SEALANTS REQUIRE A PRIMER AT THE CONCRETE APPLICATIONS SURFACES. CONSULT THE MANUFACTURER'S DATA SHEET FOR THE PRIMER TO BE APPLIED AND MOST SUITABLE FOR YOUR SEALANT. THE PRIMER MUST BE APPLIED TO THE SURFACE AT THE RECOMMENDED RATE AND ALLOWED TO DRY BEFORE THE SEALANT IS APPLIED

CUT TRANSVERSE SLAB BARS TO CLEAR CONC. OR ANY NOTCH
JOINT AT EAD OF CURB TO BE SAME AS JOINT AT END OF SLAB
CONSTRUCTION JOINT
EXPANSION JOINT
SLAB STEEL NOT SHOWN FOR CLARITY
20'-0" CONC SLAB SLAB
PLAN VIEW
SCALE - 1/4"=1'-0"
BRIDGE END POST
ELEVATION VIEW
SCALE - 1/4"=1'-0"
CURB DETAILS
ASPHALT CEMENT OR APPROVED EQUAL
PERMISSIBLE CONSTRUCTION JOINT
EXTERIOR FACE OF APPROACH SLAB
TYPE 2 JOINT
TYPE 1 JOINT
SECTION C-C
SCALE 1"=1'-0"


NOTE - FOR BACKUP OF RAILS SEE STD DWG NO 88
#5 BARS
PERMISSIBLE CONSTRUCTION JOINT
#7 U BAR
#9 STRAIGHT BAR
CHAMFER EXPOSED CORNERS 3/4" OR FINISH WITH 1" A" EDG AG TOOL
VIEW A-A
SCALE - 3/4"=1'-0"


3/4" THICK LAYER OF COMPONENT COLD APPLIED ELASTOMERIC POLYMER NON SAG TYPE JOINT SEALANT CONFORMING TO REQUIREMENTS AS SHOWN ON NOTES UNDER SEALANT
ASPHALT SHOULDER
2" EXP. JT.
CONCRETE PAVEMENT
ASPHALT SHOULDER
RECESS SEAL 3/4" TYP AT
3/4" DEPTH OF EXP AT FILLER SECURELY WELDED TO CONC
PERMISSIBLE CONSTRUCTION JOINT
EXTERIOR FACE OF APPROACH SLAB
TYPE 2 JOINT
TYPE 1 JOINT




NOTE TRAFFIC SHALL NOT BE PERMITTED ON NEW APPROACH SLAB FOR AT LEAST 14 DAYS AFTER CONC HAS BEEN PLACED. TRAFFIC SHALL NOT BE ALLOWED TO DRIVE WITHIN 5 FEET OF THE CONSTRUCTION JOINT AND SHALL BE RESTRICTED TO A SPEED OF NOT MORE THAN 5 MPH FOR AT LEAST 48 HOURS AFTER THE CONCRETE IN ADJACENT SLAB HAS BEEN PLACED

USE ONLY WHEN SHOWN ON THE PLANS OR APPROVED BY THE ENGINEER

| STANDARD DRAWING | |
|---|---|
| REFERENCE STANDARD SPEC SECTION 30 | DWG NO 18 |
| STANDARD CONCRETE APPROACH SLAB TO STRUCTURES | |
| APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS BY ADMINISTRATOR - ENGINEERING DIVISION | |

| | | | |
|---|---|---|---|
| REVISED | | | 12/20/74 |
| EFFECTIVE | 3/1/72 | | 2/1/75 |

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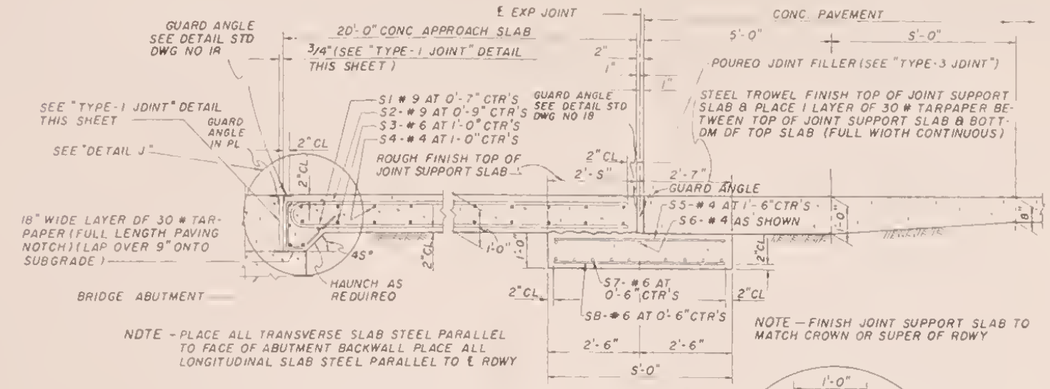
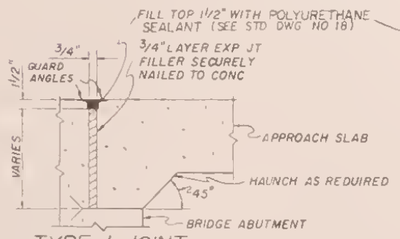

℄ EXP JOINT
CONC. PAVEMENT
GUARD ANGLE SEE DETAIL STD DWG NO 18
20'-0" CONC APPROACH SLAB
3/4" (SEE "TYPE-1 JOINT" DETAIL THIS SHEET)
5'-0"
5'-0"
POURED JOINT FILLER (SEE "TYPE-3 JOINT")
SEE "TYPE-1 JOINT" DETAIL THIS SHEET
GUARD ANGLE IN PL
S1-#9 AT 0'-7" CTR'S
S2-#9 AT 0'-9" CTR'S
S3-#6 AT 1'-0" CTR'S
S4-#4 AT 1'-0" CTR'S
GUARD ANGLE SEE DETAIL STD DWG NO 18
STEEL TROWEL FINISH TOP OF JOINT SUPPORT SLAB & PLACE 1 LAYER OF 30# TARPAPER BETWEEN TOP OF JOINT SUPPORT SLAB & BOTTOM OF TOP SLAB (FULL WIOTH CONTINUOUS)
SEE "DETAIL J"
ROUGH FINISH TOP OF JOINT SUPPORT SLAB
2"CL
2'-5"
2'-7"
GUARD ANGLE
S5-#4 AT 1'-6" CTR'S
S6-#4 AS SHOWN
18" WIDE LAYER OF 30# TARPAPER (FULL LENGTH PAVING NOTCH) (LAP OVER 9" ONTO SUBGRADE)
45°
HAUNCH AS REQUIRED
BRIDGE ABUTMENT
S7-#6 AT 0'-6" CTR'S
S8-#6 AT 0'-6" CTR'S
2'-6"
2'-6"
5'-0"
NOTE - PLACE ALL TRANSVERSE SLAB STEEL PARALLEL TO FACE OF ABUTMENT BACKWALL PLACE ALL LONGITUDINAL SLAB STEEL PARALLEL TO ℄ RDWY
NOTE - FINISH JOINT SUPPORT SLAB TO MATCH CROWN OR SUPER OF RDWY

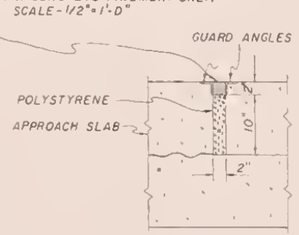
## STANDARD APPROACH SLAB TYPE-C

(FOR USE WITH CONCRETE PAVEMENT ONLY)
SCALE - 1/2" = 1'-0"



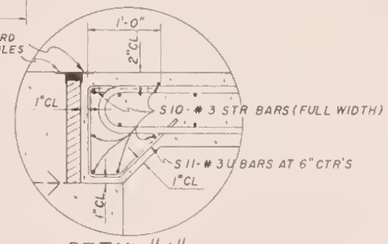

## TYPE 1 JOINT

(FOR RIGID ABUT.)
SCALE 1" = 1'-0"



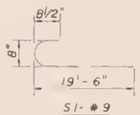

## TYPE 3 JOINT

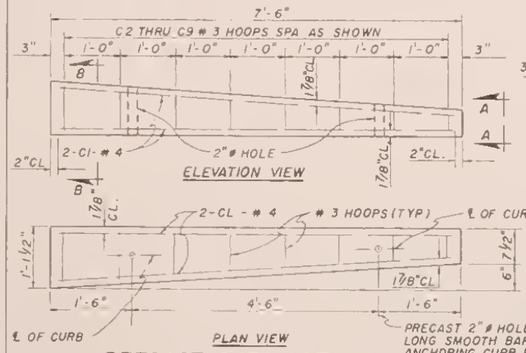
(FOR USE OVER JOINT SUPPORT SLAB ONLY)
SALE - 1" = 1'-0"

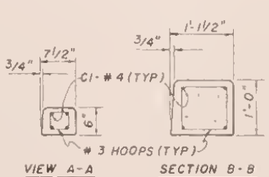



## DETAIL "J"

SCALE 1" = 1'-0"




NOTE: APPROACH SLAB AND CURB SHALL BE GIVEN A PROTECTIVE COATING OF BOILED LINSEED OIL SEE STD SPECIFICATIONS

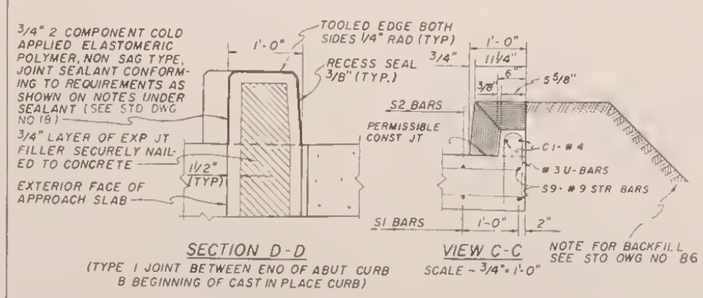
NOTE SLAB ANO CURB SHALL BE CURVED OR TAPEREO WHEN NECESSARY TO MATCH ROADWAY

CHAMFER EXPOSEO CORNERS OF PRECAST CURB ANO ABUTMENT CURB 3/4"

PRECAST 2" ø HOLES IN CURB, USE 3/4" ø X 24" LONG SMOOTH BARS TO ANCHOR CURB AFTER ANCHORING CURB IN PLACE, GROUT HOLES FLUSH TO TOP OF CURB

## PRECAST CURB DETAILS

SCALE 3/4" = 1'-0"



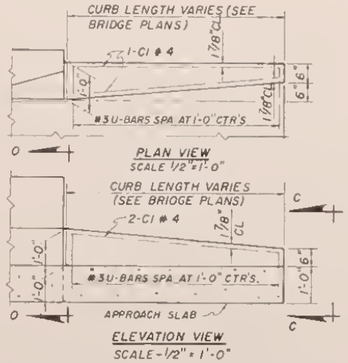

## SECTION D-D

(TYPE 1 JOINT BETWEEN ENO OF ABUT CURB & BEGINNING OF CAST IN PLACE CURB)

SCALE 1" = 1'-0"

## VIEW C-C

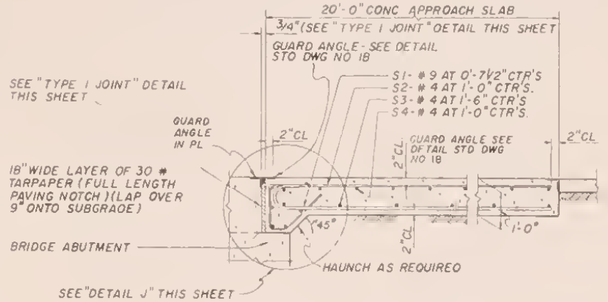
SCALE - 3/4" = 1'-0"

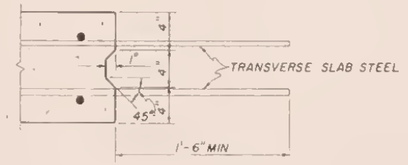



## CAST IN PLACE CURB DETAILS

## STANDARD APPROACH SLAB TYPE-D

(FOR USE WITH ASPHALT PAVEMENT ONLY)
SCALE - 1/2" = 1'-0"


20'-0" CONC APPROACH SLAB
3/4" (SEE "TYPE 1 JOINT" DETAIL THIS SHEET
GUARD ANGLE - SEE DETAIL STD DWG NO 18
SEE "TYPE 1 JOINT" DETAIL THIS SHEET
S1-#9 AT 0'-7 1/2" CTR'S
S2-#4 AT 1'-0" CTR'S.
S3-#4 AT 1'-6" CTR'S
S4-#4 AT 1'-0" CTR'S.
GUARD ANGLE IN PL
2"CL
GUARD ANGLE SEE DETAIL STD DWG NO 18
18" WIDE LAYER OF 30# TARPAPER (FULL LENGTH PAVING NOTCH) (LAP OVER 9" ONTO SUBGRADE)
45°
1'-0"
BRIDGE ABUTMENT
HAUNCH AS REQUIREO
SEE "DETAIL J" THIS SHEET




## LONGITUDINAL CONSTRUCTION JOINT DETAIL

SCALE - 1 1/2" = 1'-0"

(USE ONLY WHEN SHOWN ON THE PLANS OR APPROVED BY THE ENGINEER)

**APPROACH SLAB** APPROACH SLAB SHALL BE CONSTRUCTED IN ACCORDANCE WITH SECTION 41 OF THE STANDARO SPECIFICATIONS THE SLAB SHALL BE FINISHED AS SPECIFIEO FOR BRIDGE DECKS IN ARTICLE 41 04 (K) 2 & 3 OF THE STANDARD SPECIFICATIONS CONCRETE SHALL BE EITHER CLASS AD OR CLASS AP AT CONTRACTOR'S OPTION

**REINFORCING STEEL:** REINFORCING STEEL SHALL BE IN ACCROANCE WITH SECTION 47 OF THE STANDARO SPECIFICATIONS EXCEPT METHOD OF MEASUREMENT AND PAYMENT SHALL BE AS SET FORTH BELOW

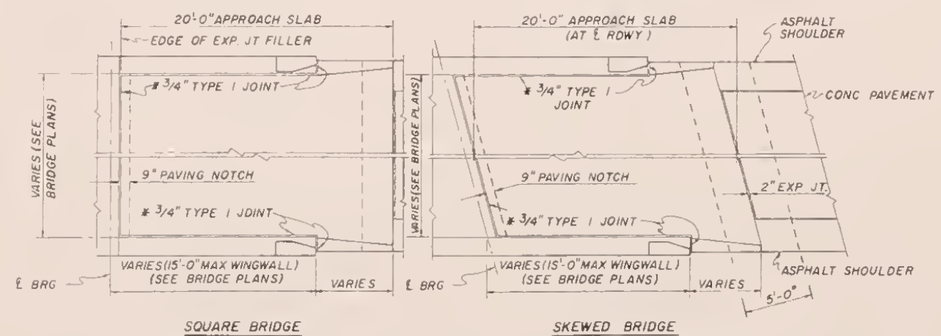
**FOUNDATION** THE FOUNDATION FOR THE APPROACH SLAB AND JOINT SUPPORT SLAB SHALL CONSIST OF THE SUBGRADE AND BASE CONSTRUCTED AND COMPACTED IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS EXCAVATION FOR JOINT SUPPORT SLAB SHALL BE HELD TO A MINIMUM AND ALL AREA EXCAVATED BUT NOT FILLED WITH CONCRETE SHALL BE BACKFILLED WITH THE SAME MATERIAL THAT WAS TAKEN FROM THE EXCAVATION ALL BACKFILL SHALL BE LAYER PLACEO AND COMPACTEO WITH MECHANICAL TAMPERS. THE COST OF ALL EXCAVATION NECESSARY FOR THE PLACEMENT OF APPROACH SLAB AND JOINT SUPPORT SLAB SHALL BE INCLUOED IN THE UNIT PRICE BIO FOR "CONCRETE APPROACH SLAB" AS SET FORTH BELOW.

**MEASUREMENT & PAYMENT:** APPROACH SLABS SHALL BE MEASURED BY AREA IN SQUARE YARDS. THE WIOTH AND LENGTH FOR MEASUREMENT SHALL BE FROM OUT TO OUT OF COMPLETED SLAB NO ADDITIONAL AREA WILL BE ALLOWED FOR THE JOINT SUPPORT SLAB. THE UNIT PRICE BIO PER SQUARE YARO FOR "CONCRETE APPROACH SLAB" SHALL BE FULL COMPENSATION FOR FURNISHING ALL MATERIALS, EQUIPMENT, TOOLS AND LABOR NECESSARY TO COMPLETE THE WORK, INCLUOING THE JOINT SUPPORT SLAB AND LINSEED TREATMENT

**PROTECTIVE COATING:** APPROACH SLAB AND CURB SHALL BE GIVEN A PROTECTIVE COATING OF BOILED LINSEED OIL SEE STANDARD SPECIFICATIONS.

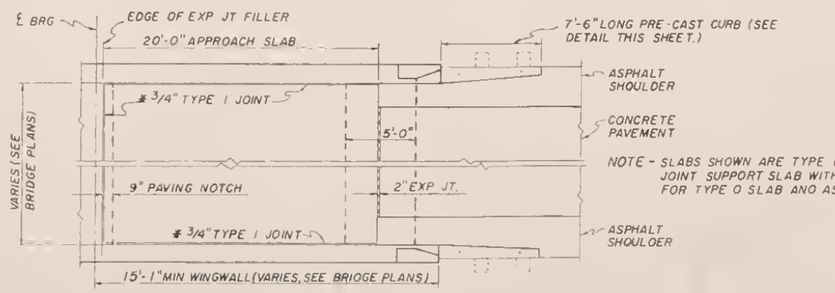
NOTE: TRAFFIC SHALL NOT BE PERMITTEO ON NEW APPROACH SLAB FOR AT LEAST 14 DAYS AFTER CONCRETE HAS BEEN PLACEO TRAFFIC SHALL NOT BE ALLOWED TO DRIVE WITHIN 5 FEET OF THE CONSTRUCTION JOINT AND SHALL BE RESTRICTED TO A SPEED OF NOT MORE THAN 5 M.P.H. FOR AT LEAST 48 HOURS AFTER THE CONCRETE IN AOJACENT SLAB HAS BEEN PLACED

# TYPE 2 JOINT MAY BE SUBSTITUTEO AS SPECIFIED ON BRIDGE GENERAL LAYOUT FOR DETAIL OF TYPE 2 JOINT SEE STO OWG NO 18




## APPROACH SLAB WITH CAST IN PLACE CURB (15'-0" MAXIMUM WINGWALLS)

SCALE - 3/16" = 1'-0"




NOTE - SLABS SHOWN ARE TYPE C FOR CONC PAVEMENT JOINT SUPPORT SLAB WITH EXP JT. NOT REQUIREO FOR TYPE O SLAB ANO ASPHALT PAVEMENT

## APPROACH SLAB WITH PRECAST CURBS (15'-1" MINIMUM WINGWALLS)

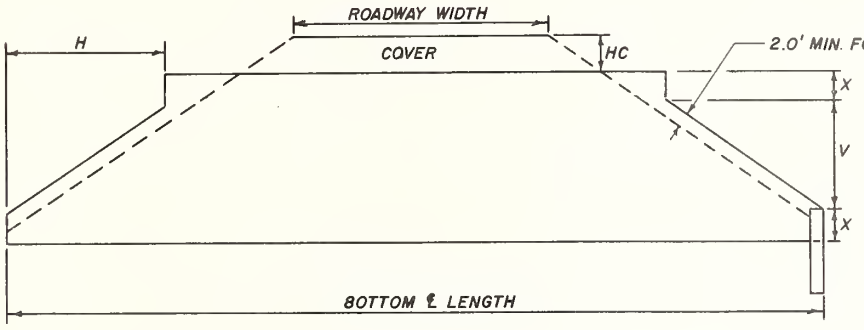
SCALE 3/16" = 1'-0"

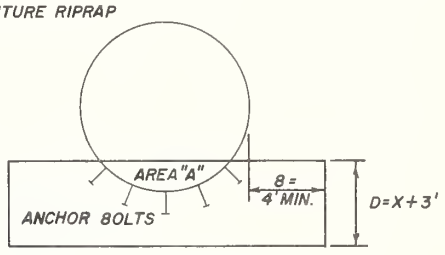
| STANDARD DRAWING | |
|---|---|
| REFERENCE STANDARD SPEC SECTION 39 | OWG NO. 19 |

STANDARD CONCRETE APPROACH SLABS TO STRUCTURES WITH U-TYPE ABUTMENTS

| | | |
|---|---|---|
| REVISED | | 12/20/74 |
| EFFECTIVE | 3/1/72 | 2/1/75 |

APPROVED BY: A. ANDERSON - DIRECTOR OF HIGHWAYS
BY: [signature]
ADMINISTATOR - ENGINEERING DIVISION




NOTE: FOR DETAILS, SEE STANDARD DWG. NO. 30 COVERING CUTOFF WALLS

| DIA. (IN.) | X * (FT.) | H IN FEET FOR BEVELS OF: 1.5:1 | 2:1 | V * (FT.) | AREA "A" SQ. FT. |
|---|---|---|---|---|---|
| 48 | 1.000 | 3.000 | 4.000 | 2.000 | 2.46 |
| 54 | 1.125 | 3.375 | 4.500 | 2.250 | 3.11 |
| 60 | 1.250 | 3.750 | 5.000 | 2.500 | 3.83 |
| 66 | 1.375 | 4.125 | 5.500 | 2.750 | 4.44 |
| 72 | 1.500 | 4.500 | 6.000 | 3.000 | 5.53 |
| 78 | 1.625 | 4.875 | 6.500 | 3.250 | 6.61 |
| 84 | 1.750 | 5.250 | 7.000 | 3.500 | 7.51 |
| 90 | 1.875 | 5.625 | 7.500 | 3.750 | 8.61 |
| 96 | 2.000 | 6.000 | 8.000 | 4.000 | 9.81 |
| 102 | 2.125 | 6.375 | 8.500 | 4.250 | 11.08 |
| 108 | 2.250 | 6.750 | 9.000 | 4.500 | 12.42 |
| 114 | 2.375 | 7.125 | 9.500 | 4.750 | 13.84 |
| 120 | 2.500 | 7.500 | 10.000 | 5.000 | 15.38 |
| 126 | 2.625 | 7.875 | 10.500 | 5.250 | 16.98 |
| 132 | 2.750 | 8.250 | 11.000 | 5.500 | 18.50 |

| DIA. (IN.) | X * (FT.) | H IN FEET FOR BEVELS OF: 1.5:1 | 2:1 | V * (FT.) | AREA "A" SQ. FT. |
|---|---|---|---|---|---|
| 138 | 2.875 | 8.625 | 11.500 | 5.750 | 20.30 |
| 144 | 3.000 | 9.000 | 12.000 | 6.000 | 22.10 |
| 150 | 3.125 | 9.375 | 12.500 | 6.250 | 24.00 |
| 156 | 3.250 | 9.750 | 13.000 | 6.500 | 25.9 |
| 162 | 3.375 | 10.125 | 13.500 | 6.750 | 27.9 |
| 168 | 3.500 | 10.500 | 14.000 | 7.000 | 30.1 |
| 174 | 3.625 | 10.875 | 14.500 | 7.250 | 32.2 |
| 180 | 3.750 | 11.250 | 15.000 | 7.500 | 34.5 |
| 192 | 4.000 | 12.000 | 16.000 | 8.000 | 39.3 |
| 198 | 4.125 | 12.375 | 16.500 | 8.250 | 41.7 |
| 204 | 4.250 | 12.750 | 17.000 | 8.500 | 44.2 |
| 210 | 4.375 | 13.125 | 17.500 | 8.750 | 46.9 |
| 216 | 4.500 | 13.500 | 18.000 | 9.000 | 49.7 |
| 228 | 4.750 | 14.250 | 19.000 | 9.500 | 55.5 |
| 240 | 5.000 | 15.000 | 20.000 | 10.000 | 61.5 |
| 252 | 5.250 | 15.750 | 21.000 | 10.500 | 67.7 |

TOLERANCE OF ± 4% WILL BE ALLOWED IN ALL DIMENSIONS.

USE SKEW ENDS WHEN SKEW IS GREATER THAN 15° BUT NOT GREATER THAN 45°.

* FOR ELLIPTICAL PIPE, INCREASE VERTICAL DIMENSIONS BY PERCENT OF ELLIPSE.

STANDARD DRAWING

REFERENCE: STANDARD SPEC. SECTION 59

DWG. NO. 44

# STEP BEVEL FOR CIRCULAR C.S.P. & S.S.P.

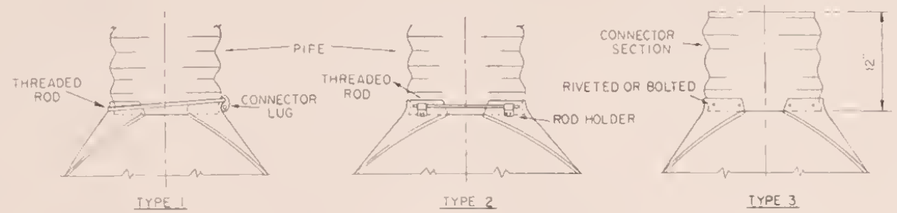
| | | | |
|---|---|---|---|
| REVISED | | 12/20/74 | |
| EFFECTIVE | 3/1/72 | 2/1/75 | |

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS

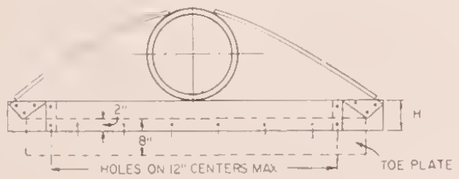
BY Jack R. Parker

ADMINISTRATOR - ENGINEERING DIVISION

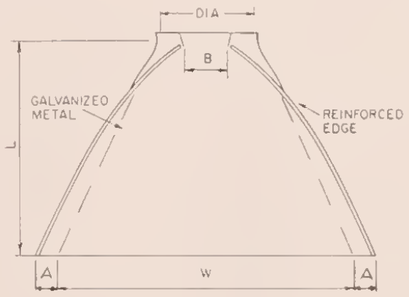
## CONNECTIONS




## ROUND PIPE




ELEVATION




PLAN

TYPICAL CROSS-SECTION

(ILLUSTRATED WITH TYPE 3 CONNECTION)

| PIPE DIAM | MIN THICK-NESS | DIMENSIONS A 1" Tol | B Max | H 1" Tol | L 1½" Tol | W 2" Tol | Type Connector |
|---|---|---|---|---|---|---|---|
| 12" | 0.064 | 6 | 6" | 6" | 21" | 24" | 1 |
| 15" | 0.064 | 7 | 8 | 6 | 26 | 30 | 1 |
| 18 | 0.064 | 8 | 10 | 6 | 31 | 36 | 1 |
| 21 | 0.064 | 9 | 12 | 6 | 36 | 42 | 1 |
| 24 | 0.064 | 10 | 13 | 6 | 41 | 48 | 1 |
| 30" | 0.079 | 12 | 16 | 8 | 51 | 60 | 2 |
| 36" | 0.079 | 14 | 19 | 9 | 60 | 72 | 2 |
| 42 | 0.109 | 6 | 22 | 11 | 59 | 84 | 3 |
| 48" | 0.109 | 16 | 27 | 12 | 78 | 90 | 3 |
| 54" | 0.109 | 18 | 30 | 12 | 84 | 102 | 3 |
| 60" | 0.109 | 18 | 33 | 12 | 87 | 114 | 3 |
| 66" | 0.109 | 18 | 36 | 12 | 87 | 120 | 3 |
| 72" | 0.109 | 18 | 39 | 12 | 87 | 126 | 3 |
| 78" | 0.109 | 18 | 42 | 12 | 87 | 132 | 3 |
| 84" | 0.109 | 18 | 45 | 12 | 87 | 138 | 3 |

FLARED END TERMINAL SECTION TO BE INCLUDED IN LENGTH OF PIPE SHOWN ON PLANS.

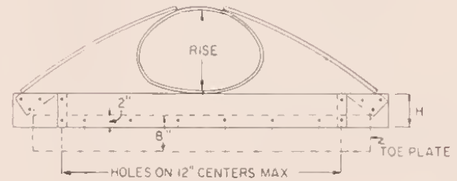
ALL PARTS ARE TO BE GALVANIZED IN ACCORDANCE WITH AASHO M-36.

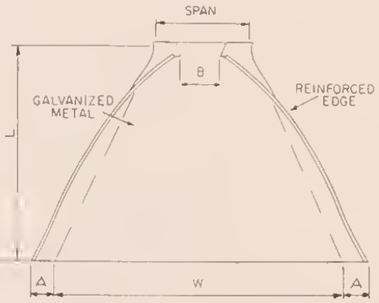
ANY AREAS WHERE GALVANIZING IS BROKEN OR METAL IS BARE SHALL BE PAINTED WITH ONE COAT OF RED LEAD OR ZINC CHROMATE PRIME AND TWO COATS OF ALUMINUM PAINT.

MINOR VARIATIONS IN DESIGN MAY BE ACCEPTABLE ON APPROVAL OF THE ENGINEER. SEAMS OR JOINTS LENGTHWISE OF THE APRON WILL BE ACCEPTABLE IF SECURELY BOLTED OR WELDED AND PAINTED AS PROVIDED ABOVE.

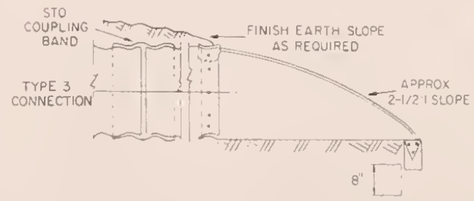
FOR TYPE OF CONNECTION ON ARCH AND ROUND PIPE SEE DETAILS THIS SHEET.

## ARCH PIPE




PLAN




| PIPE-ARCH DIMENSION SPAN | RISE | MIN THICK-NESS | DIMENSIONS A 1" Tol | B Max | H 1" Tol | L 1½" Tol | W 2" Tol | TYPE CONN. |
|---|---|---|---|---|---|---|---|---|
| 17 | 13 | 0.064 | 7 | 9" | 6" | 19" | 30" | 2 |
| 21 | 15 | 0.064 | 7 | 10 | 6 | 23 | 36 | 2 |
| 24 | 18 | 0.064 | 8 | 12 | 6 | 28 | 42 | 2 |
| 28 | 20 | 0.064 | 9 | 14 | 6 | 32 | 48 | 2 |
| 35 | 24 | 0.079 | 10 | 16 | 6 | 39 | 60 | 2 |
| 42 | 29 | 0.079 | 12 | 18 | 8 | 46 | 75 | 2 |
| 49 | 33 | 0.109 | 13 | 21 | 9 | 53 | 85 | 2 |
| 57 | 38 | 0.109 | 18 | 26 | 12 | 63 | 90 | 2 |
| 64 | 43 | 0.109 | 18 | 30 | 12 | 70 | 102 | 3 |
| 71 | 47 | 0.109 | 18 | 33 | 12 | 77 | 114 | 3 |
| 77 | 52 | 0.109 | 18 | 36 | 12 | 77 | 126 | 3 |
| 83 | 57 | 0.109 | 18 | 36 | 12 | 77 | 138 | 3 |

STANDARD DRAWING

REFERENCE. STANDARD SPEC. SECTION 56 AND 57

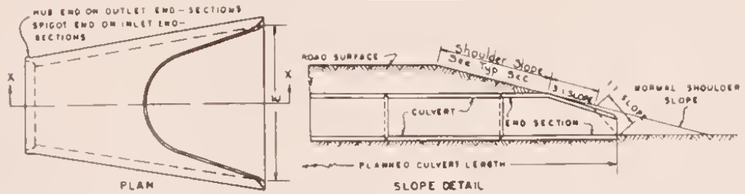
DWG NO 46

FLARED END TERMINAL SECTION
-CORRUGATED METAL PIPE-

APPROVED H.N. ANDERSON DIRECTOR OF HIGHWAYS
BY _____
ADMINISTRATOR-ENGINEERING DIVISION

| | | | |
|---|---|---|---|
| REVISED | | 12/20/74 | |
| EFFECTIVE | 3/1/72 | 2/1/73 | |

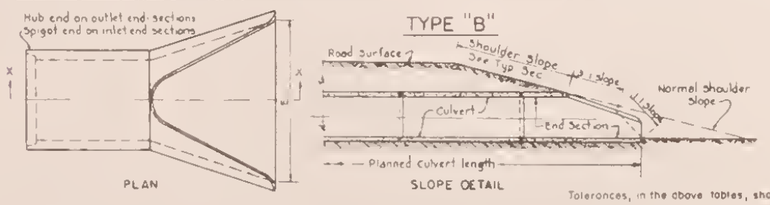
## TYPE "A"



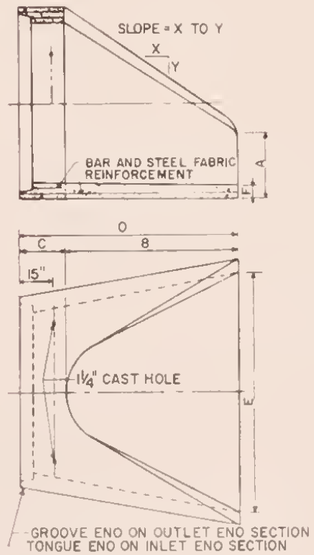

| TYPE "A" TERMINAL SECTION DIMENSION | | | | | |
|---|---|---|---|---|---|
| DIAM | A | B | C | D | E |
| 12" | 4" | 2'-0" | 4'-0 3/8" | 6'-0 3/8" | 2'-0" |
| 15" | 6" | 2'-3" | 3'-10" | 6'-1" | 2'-6" |
| 18" | 9" | 2'-3" | 3'-10" | 6'-1" | 3'-0" |
| 24" | 9 1/2" | 3'-7 1/2" | 2'-6" | 6'-1 1/2" | 4'-0" |
| 30" | 1'-0" | 4'-6" | 1'-7 3/4" | 6'-1 3/4" | 5'-0" |
| 36" | 1'-3" | 5'-3" | 2'-10 3/4" | 8'-1 3/4" | 6'-0" |
| 42" | 1'-9" | 5'-3" | 2'-11" | 8'-2" | 6'-6" |
| 48" | 2'-0" | 6'-0" | 2'-2" | 8'-2" | 7'-3" |
| 54" | 2'-3" | 5'-5" | 2'-11" | 8'-4" | 7'-6" |

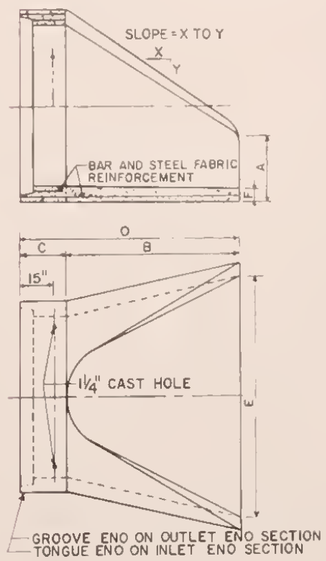
| TYPE "B" TERMINAL SECTION DIMENSION | | | | | |
|---|---|---|---|---|---|
| DIAM. | A | B | C | D | E |
| 12" | 4" | 2'-0" | 4'-0 7/8" | 6'-0 7/8" | 2'-0" |
| 15" | 6" | 2'-3" | 3'-10" | 6'-1" | 2'-6" |
| 18" | 9" | 2'-3" | 3'-10" | 6'-1" | 3'-0" |
| 24" | 9 1/2" | 3'-7 1/2" | 2'-6" | 6'-1 1/2" | 4'-0" |
| 30" | 1'-0" | 4'-6" | 1'-7 3/4" | 6'-1 3/4" | 5'-0" |
| 36" | 1'-3" | 5'-3" | 2'-10 3/4" | 8'-1 3/4" | 6'-0" |
| 42" | 1'-9" | 5'-3" | 2'-11" | 8'-2" | 6'-6" |
| 48" | 2'-0" | 6'-0" | 2'-2" | 8'-2" | 7'-0" |
| 54" | 2'-3" | 5'-5" | 2'-9 1/4" | 8'-2 1/4" | 7'-6" |

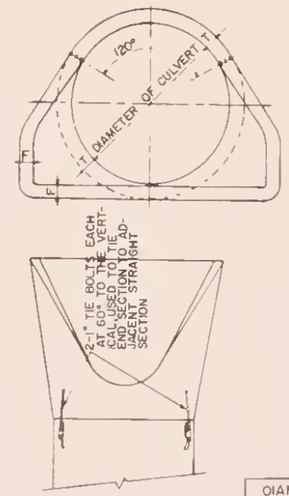
## TYPE "B"



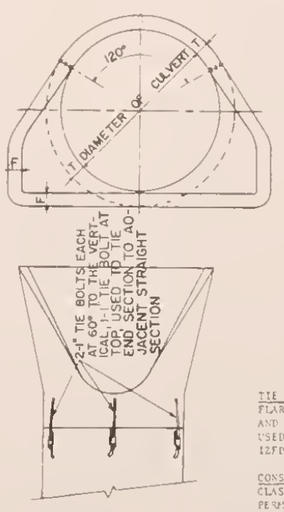

Tolerances, in the above tables, shall not vary more than ±1.5% for the dimensions shown. Otherwise they shall conform to AASHO M-170




| DIAM | SLOPE | T | A | B | C | O | E | F |
|---|---|---|---|---|---|---|---|---|
| 60" | 2:1 | 6" | 2'11" | 5' | 3'3" | 8'3" | 8' | 5" |
| 72" | 1.86:1 | 7" | 3' | 6'6" | 1'9" | 8'3" | 9' | 6" |
| 84" | 1.5:1 | 8" | 3" | 7'6½" | 1'9" | 9'3½" | 10' | 6½" |




TIE BOLTS. TIE BOLTS TO BE USED ON 72" AND 84" FLARED END SECTIONS. THREE TIE BOLTS, ONE AT TOP AND ONE ON EACH SIDE AT THE HORIZONTAL, SHALL BE USED WHEN REQUIRED. ALL PARTS SHALL BE GALVANIZED.

CONSTRUCTION. CONSTRUCTION SHALL CONFORM TO CLASS III, AASHO M 170, AS FAR AS DESIGN WILL PERMIT.

FLARED END TERMINAL SECTIONS WILL BE INCLUDED IN LENGTH OF PIPE SHOWN ON PLANS.

STANDARD DRAWING

REFERENCE. STANDARD SPEC. SECTION 62

DWG. NO. 47

PREFABRICATED TERMINAL SECTION FOR REINFORCED CONCRETE PIPE

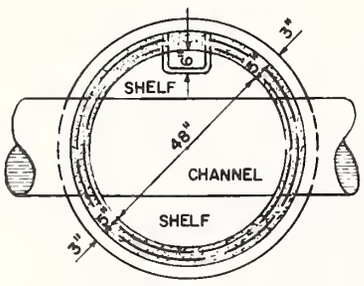
| | | | |
|---|---|---|---|
| REVISED | | 12/20/74 | |
| EFFECTIVE | 3/1/72 | 2/1/73 | |

APPROVED H. J. ANDERSON-DIRECTOR OF HIGHWAYS

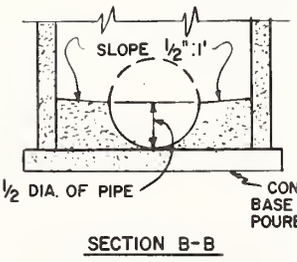
BY Jack P. Becker

ADMINISTRATOR-ENGINEERING DIVISION

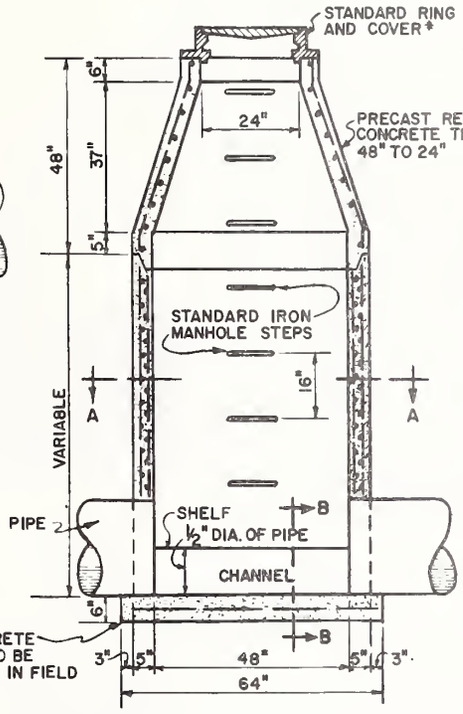
ANY OTHER TYPE OF MANHOLE REQUIRED WILL BE DESIGNED AND DESIGNATED AS "SPECIAL MANHOLE".




SECTION A-A




SECTION B-B



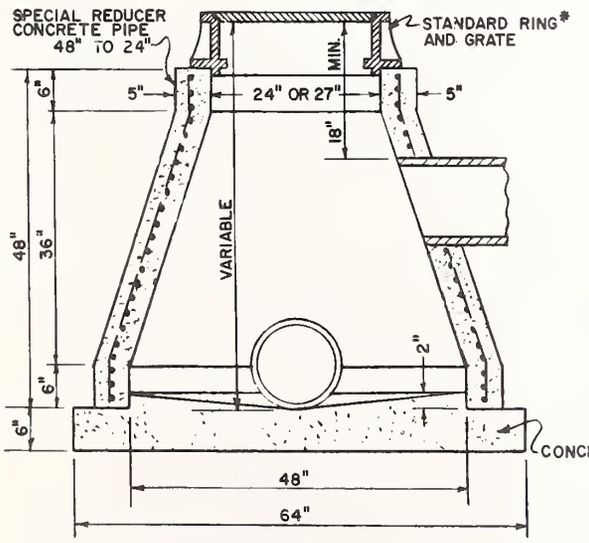

ELEVATION

* MINIMUM WEIGHT FOR RING AND COVER IS 400 LBS. RING AND COVER SHALL BE TOOLED TO A MACHINE FIT.

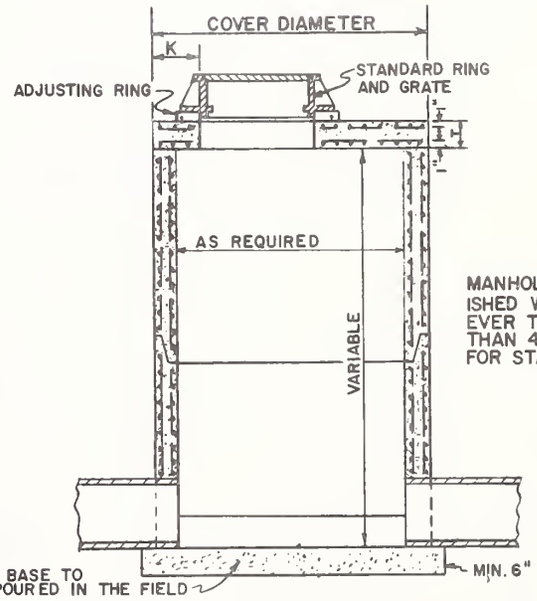
UPPER PART TO BE SPECIAL SECTION TO REDUCE DIAMETER FROM 48" TO 24".
BOTTOM OF LOWER SECTION TO BE CUT SQUARE TO FIT BASE. GROUT JOINT BETWEEN BASE AND WALL. A GROUT CONSISTING OF ONE PART PORTLAND CEMENT AND TWO PARTS APPROVED SAND MAY BE USED; AN APPROVED PRE-MIXED GROUT, AVAILABLE COMMERCIALLY, MAY BE USED.

ALL MANHOLE CONSTRUCTION, EXCEPTING RING, COVER, AND BASE, SHALL CONFORM TO A.S.T.M C 478. THIS PROVIDES THAT REINFORCEMENT MAY BE MADE OF (1) COLD DRAWN STEEL WIRE - A.S.T.M A 82, (2) STEEL WIRE FABRIC - A.S.T.M. A185, OR (3) STEEL BARS - A.S.T.M. A15.
THE CONSTRUCTION AND REINFORCEMENT OF THE BASE FOR EACH TYPE SHALL BE COMPATIBLE WITH THE CONDITIONS AND THE WEIGHT OF THE SUPERSTRUCTURE. A.S.T.M. C 478 PROVIDES FOR 4000 PSI CONCRETE. THE MIX CALLS FOR 6 SACKS OF CEMENT / CU. YD. REINFORCEMENT SHOWN IS ILLUSTRATIVE ONLY. SEE A.S.T.M. C 478.
THE ECCENTRIC CONE PRECAST TOP WILL BE PERMITTED WHEN ITS USE WILL BE AS GOOD OR BETTER THAN THE ONES SHOWN, OR IF IT IS MORE ADAPTABLE TO EXISTING CONDITIONS.

## TYPE 1 MANHOLE

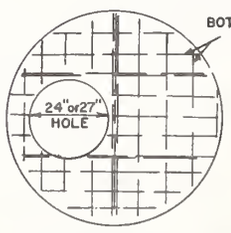



## TYPE 2 MANHOLE




MANHOLE WILL BE FURNISHED WITH STEPS WHENEVER THE DEPTH IS MORE THAN 4 FEET. SEE TYPE 1 FOR STANDARD.

## TYPE 3 MANHOLE




TYPE 3 MANHOLE COVER

| TYPE 3 M.H COVER | | | |
|---|---|---|---|
| PIPE DIA. | COVER DIA. | T | K |
| 48" | 58" | 6" | 6" |
| 54" | 65" | 8" | 6" |
| 60" | 72" | 8" | 7" |
| 66" | 79" | 8" | 7" |
| 72" | 86" | 8" | 8" |

STANDARD DRAWING

REFERENCE: STANDARD SPEC. SECTION 77

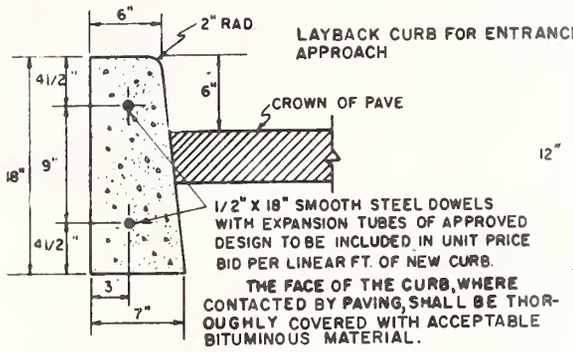
DWG. NO. 57

PRECAST CONCRETE MANHOLE

| | | | | |
|---|---|---|---|---|
| REVISED | | 12/1/72 | 12/20/74 | |
| EFFECTIVE | 3/1/72 | 1/1/73 | 2/1/75 | |

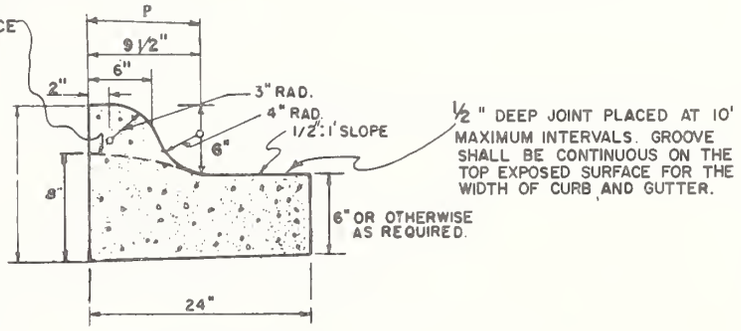
APPROVED: H.J. ANDERSON - DIRECTOR OF HIGHWAYS
BY [signature]
ADMINISTRATOR - ENGINEERING DIVISION

# CONCRETE CURBS


6"
2" RAD
LAYBACK CURB FOR ENTRANCE APPROACH
4 1/2"
6"
CROWN OF PAVE
18"
9"
1/2" X 18" SMOOTH STEEL DOWELS WITH EXPANSION TUBES OF APPROVED DESIGN TO BE INCLUDED IN UNIT PRICE BID PER LINEAR FT. OF NEW CURB.
4 1/2"
3"
7"
THE FACE OF THE CURB, WHERE CONTACTED BY PAVING, SHALL BE THOROUGHLY COVERED WITH ACCEPTABLE BITUMINOUS MATERIAL.

CURB

* 0.031 C.Y. CONC. PER 1.0'




CURB & GUTTER

* 0.048 C.Y. CONC. PER 1.0' FOR 6" GUTTER

P- WHEN PAINTED CURB IS REQUIRED, THIS IS THE AREA TO BE COVERED. PAINTING INCLUDED IN COST OF CURB.

JOINTS:

(A) When definitely tied to pavement slab.
Separate curb or integral curb and gutter shall have the expansion joint of the pavement slab extended through and shall be completely filled with a minimum of $\frac{1}{2}$" width of preformed expansion joint filler with dowel bars fitted with expansion tubes at each joint.

(B) When not tied to pavement slab.
Separate curb or integral curb and gutter shall have through joints at predetermined intervals filled with a minimum of $\frac{1}{2}$" width of preformed expansion joint filler. Such joint intervals shall be determined by prorating the distance between curb returns with such intervals to be not less than 50 feet nor greater than 60 feet. Preformed expansion joint filler shall be placed at all curb returns, bridges, drop inlets and where meeting curb and gutter in place.

Contraction joints in the curb and gutter shall be spaced at 10 foot intervals. These joints shall be 1/8" minimum width and constructed to a minimum depth of $\frac{1}{2}$". Contraction joints shall be constructed by sawing or scoring. When scoring a tool shall be used which will leave the corners rounded and destroy aggregate interlock to the depth specified for sawing of the joint.

(C) A minimum $\frac{1}{2}$" width of preformed expansion joint filler shall be placed between the curb or gutter and auy concrete pavement slab.

(D) A minimum $\frac{1}{2}$" width of preformed expansion joint filler shall be placed between the curb and sidewalk or any solid structure.

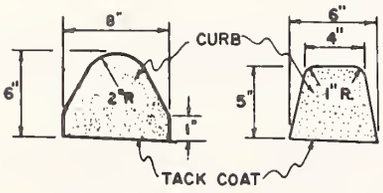
(E) Preformed expansion joint filler shall comply with the requirements of Standard Spec. M-150.

RADII:
Minimum curb return radii - 10'

15' radii desirable for streets

CONCRETE:
Unless otherwise specified, concrete curbs and concrete integral curb and gutter shall be constructed of air-entrained class "DD" concrete or equal.

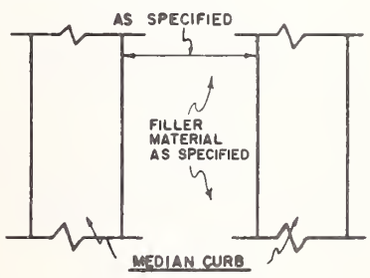
# BITUMINOUS CURBS

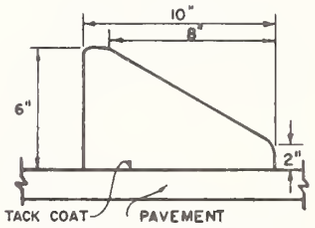



THE CONTRACTOR MAY USE EITHER THE 6" OR THE 8" CURB.

CURB SECTION

* 1 CU. FT. OF MATERIAL WILL MAKE ABOUT 5 LINEAR FT. OF CURB.




MEDIAN CURB SECTION

* 1 CU. FT. OF MATERIAL WILL MAKE ABOUT 3.5 LINEAR FT. OF CURB.

ALL MATERIALS AND CONSTRUCTION TO CONFORM TO STANDARD SPECIFICATIONS FOR BITUMINOUS CURB.

* QUANTITIES FOR ESTIMATING PURPOSES ONLY.

| | | |
|---|---|---|
| REVISED | | 12/20/74 |
| EFFECTIVE | 3/1/72 | 2/1/75 |

STANDARD DRAWING

REFERENCE: STANDARD SPEC. SECTION 75

DWG. NO. 66

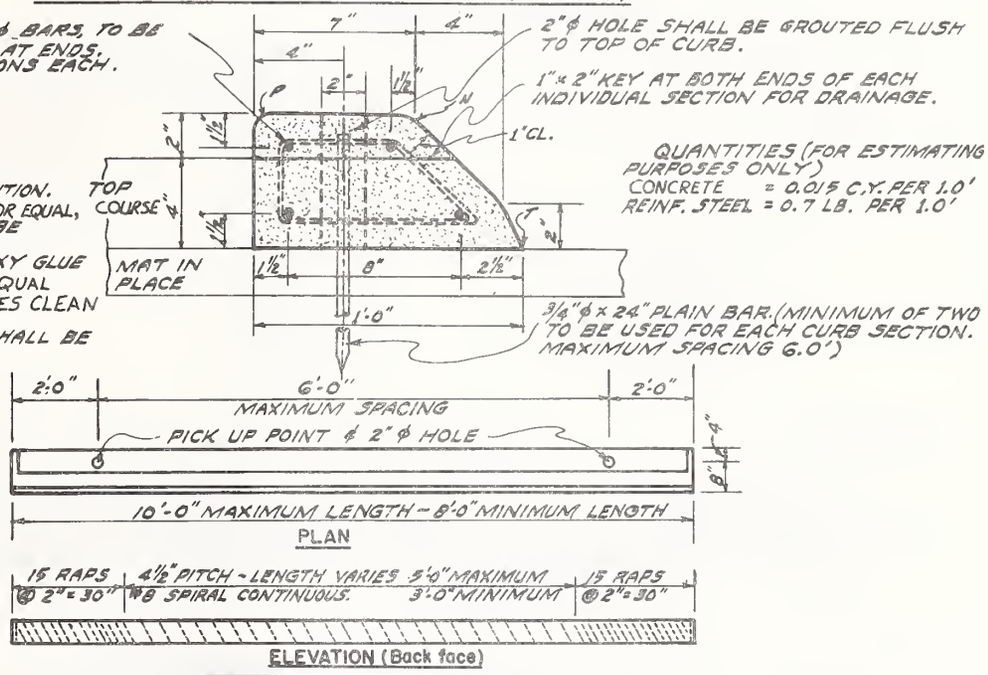
STANDARD CURBS

APPROVED: H.J. ANDERSON - DIRECTOR OF HIGHWAYS
BY [signature]
ADMINISTRATOR - ENGINEERING DIVISION

## PRECAST-PRESTRESSED CONCRETE CURB (TYPE "A")

REINFORCE WITH 4-1/4"ϕ BARS, TO BE CUT 1/2" BACK FROM FACE AT ENDS. JACKING LOAD = 3.1 TONS EACH.

NOTES:- CURBS TO BE CAST IN INVERTED POSITION. CLASS "DD" CONCRETE OR EQUAL, TYPE III CEMENT TO BE USED THROUGHOUT. PATCH HOLE WITH EPOXY GLUE TRETOL NO. T385 OR EQUAL MIXED WITH FOUR VOLUMES CLEAN SHARP SAND. ALL EXPOSED EDGES SHALL BE ROUNDED 3/4" RADIUS. CONCRETE - 4000 PSI @ TRANSFER.




2"ϕ HOLE SHALL BE GROUTED FLUSH TO TOP OF CURB.

1"x 2" KEY AT BOTH ENDS OF EACH INDIVIDUAL SECTION FOR DRAINAGE.

QUANTITIES (FOR ESTIMATING PURPOSES ONLY)
CONCRETE = 0.015 C.Y. PER 1.0'
REINF. STEEL = 0.7 LB. PER 1.0'

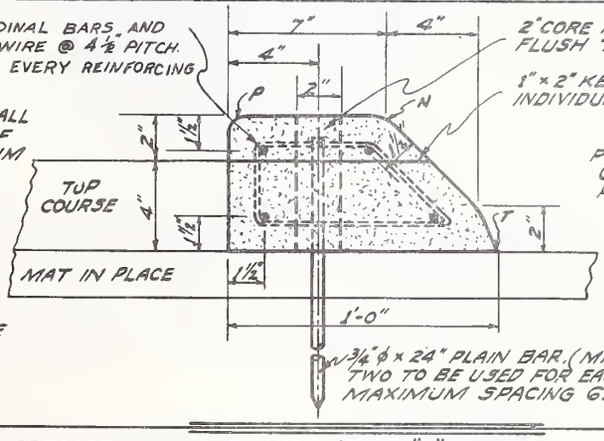
3/4"ϕ x 24" PLAIN BAR. (MINIMUM OF TWO TO BE USED FOR EACH CURB SECTION. MAXIMUM SPACING 6.0')

## PRECAST CONCRETE CURB (TYPE "A" - Mat in place)

REINFORCE WITH 4-#4 LONGITUDINAL BARS AND WRAP WITH W1.5 OR LARGER WIRE @ 4½ PITCH. TIE W1.5 OR LARGER WIRE TO EVERY REINFORCING BAR @ 2' CENTERS.

NOTES: CURBS SHALL BE PRECAST A MINIMUM OF 4' LENGTHS AND A MAXIMUM OF 10' LENGTHS.
ALL EXPOSED EDGES SHALL BE ROUNDED 3/4" RADIUS.

TYPES "A" & "B" CONCRETE SHALL BE CLASS "DD" OR CONCRETE OF EQUAL STRENGTH.




2" CORE HOLE SHALL BE GROUTED FLUSH TO TOP OF CURB.

1"x 2" KEY AT BOTH ENDS OF EACH INDIVIDUAL SECTION FOR DRAINAGE.

QUANTITIES (FOR ESTIMATING PURPOSES ONLY)
CONCRETE = 0.015 C.Y. PER 1.0'
REINF. STEEL = 2.7 LBS. PER 1.0'

3/4"ϕ x 24" PLAIN BAR. (MINIMUM OF TWO TO BE USED FOR EACH CURB SECTION. MAXIMUM SPACING 6.0')

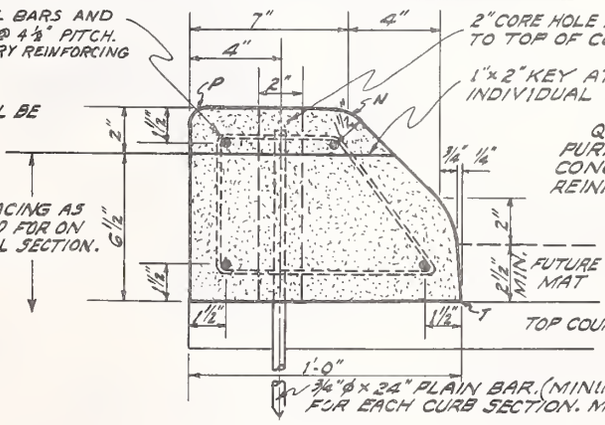
## PRECAST CONCRETE CURB (TYPE "B" - Future mat)

REINFORCE WITH 4-#4 LONGITUDINAL BARS AND WRAP WITH W1.5 OR LARGER WIRE @ 4½" PITCH. TIE W1.5 OR LARGER WIRE TO EVERY REINFORCING BAR @ 2' CENTERS.

NOTES: CURBS SHALL BE PRECAST A MINIMUM OF 4' LENGTHS AND A MAXIMUM OF 10' LENGTHS.

ALL EXPOSED EDGES SHALL BE ROUNDED 3/4" RADIUS.

SURFACING AS CALLED FOR ON TYPICAL SECTION.




2" CORE HOLE SHALL BE GROUTED FLUSH TO TOP OF CURB.

1"x 2" KEY AT BOTH ENDS OF EACH INDIVIDUAL SECTION FOR DRAINAGE.

QUANTITIES (FOR ESTIMATING PURPOSES ONLY)
CONCRETE = 0.023 C.Y. PER 1.0'
REINF. STEEL = 2.7 LBS. PER 1.0'

3/4"ϕ x 24" PLAIN BAR. (MINIMUM OF TWO TO BE USED FOR EACH CURB SECTION. MAXIMUM SPACING 6.0')

STANDARD DRAWING

REFERENCE: STANDARD SPEC. SECTION 75

DWG. NO. 67

PRECAST CONCRETE CURBS

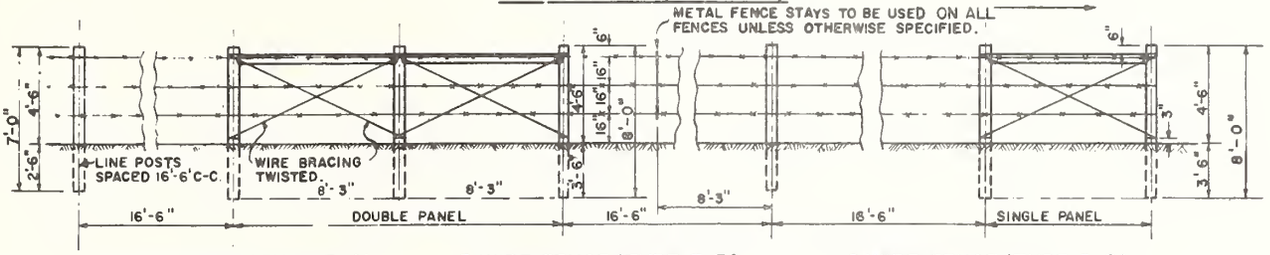
| | | |
|---|---|---|
| REVISED | | 12/20/74 |
| EFFECTIVE | 3/1/72 | 2/1/75 |

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY _____
ADMINISTATOR - ENGINEERING DIVISION

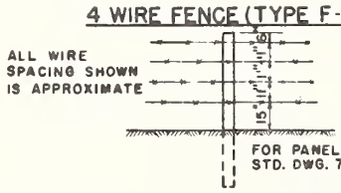
## 3 WIRE FENCE (TYPE F-3)

DIR. OF PULL

METAL FENCE STAYS TO BE USED ON ALL FENCES UNLESS OTHERWISE SPECIFIED.

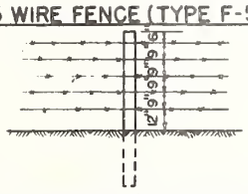



## 4 WIRE FENCE (TYPE F-4)

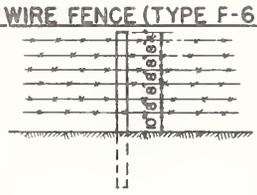



FOR PANEL DETAILS SEE STD. DWG. 75

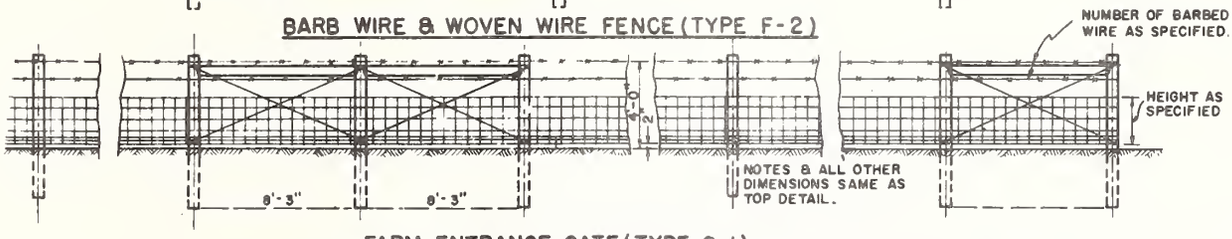
## 5 WIRE FENCE (TYPE F-5)



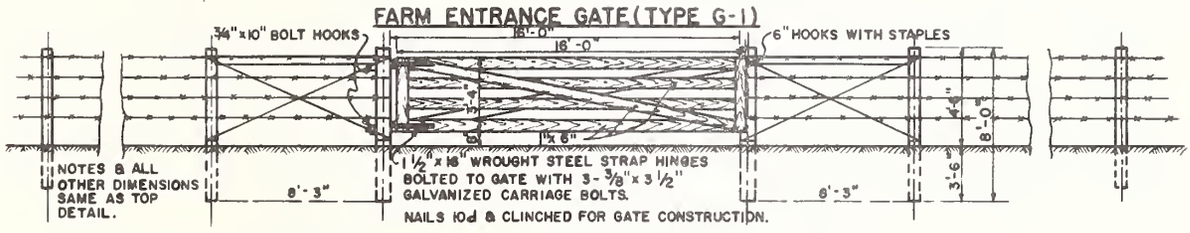

## 6 WIRE FENCE (TYPE F-6)



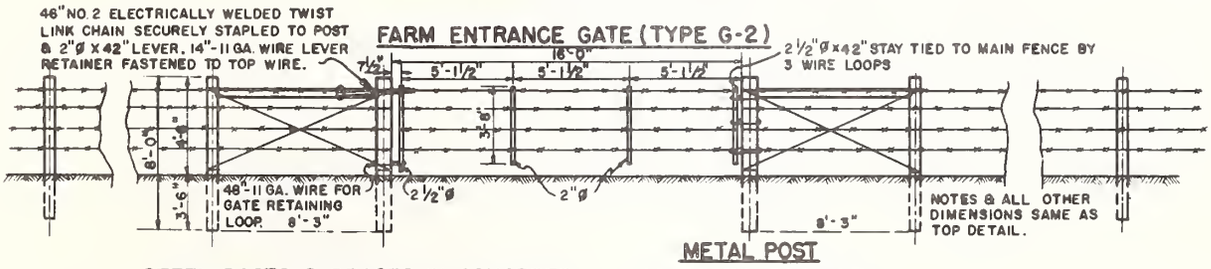

## BARB WIRE & WOVEN WIRE FENCE (TYPE F-2)



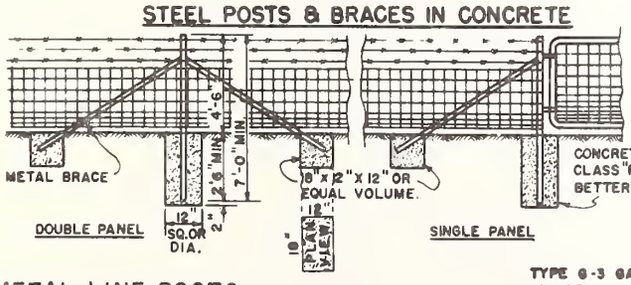

## FARM ENTRANCE GATE (TYPE G-1)



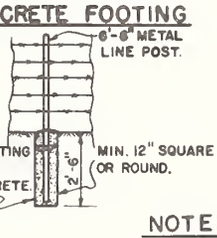

## FARM ENTRANCE GATE (TYPE G-2)


46" NO. 2 ELECTRICALLY WELDED TWIST LINK CHAIN SECURELY STAPLED TO POST & 2"ø x 42" LEVER. 14"-11 GA. WIRE LEVER RETAINER FASTENED TO TOP WIRE.
16'-0"
7½"
5'-1½"
5'-1½"
5'-1½"
2½"ø x 42" STAY TIED TO MAIN FENCE BY 3 WIRE LOOPS
8'-0"
3'-6"
48"-11 GA. WIRE FOR GATE RETAINING LOOP.
8'-3"
2½"ø
2"ø
NOTES & ALL OTHER DIMENSIONS SAME AS TOP DETAIL.

## STEEL POSTS & BRACES IN CONCRETE




## METAL POST CONCRETE FOOTING




### METAL LINE POSTS

6'-6" LONG, 1.33 LBS. PER FT, NOMINAL FACTORY PAINTED OR GALVANIZED.

### CORNER, GATE & END POSTS

8'-0" LONG (NOMINAL)

### TERMINAL POST

SHALL BE AT THE END OF ANY RUN OF WIRE OR AT ANY STRETCH PANEL.

TYPE G-3 GATE IS METAL.

A GOOD SUBSTANTIAL GATE, COMMERCIALLY AVAILABLE AND IN GENERAL USE.

### NOTE:

A DEAD MAN MAY BE A CONCRETE BLOCK, A CAST-IN-PLACE CONCRETE BLOCK, A ROCK OR OTHER APPROVED OBJECT. WEIGHING AT LEAST 150 LBS, AND COVERED AT LEAST 2 FEET

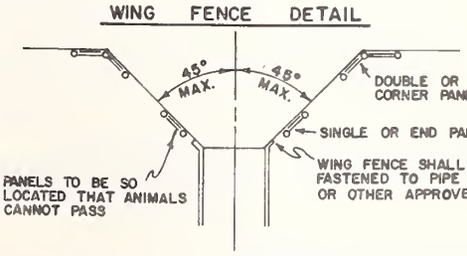
### NOTE: (STEEL POSTS)

EACH CORNER, END GATE, OR PULL POST AND EACH BRACE SHALL BE SET IN CONCRETE AND BRACED AS INDICATED.

USE A 16' GATE UNLESS R/W AGREEMENT STATES OTHERWISE.

ON TYPE G-2 FARM GATE, MATERIAL SHALL BE THE SAME AS NEW FENCE.

## WING FENCE DETAIL


45° MAX.
45° MAX.
DOUBLE OR CORNER PANELS
SINGLE OR END PANEL
WING FENCE SHALL BE SECURELY FASTENED TO PIPE BY ½" EYE BOLTS OR OTHER APPROVED METHOD.
PANELS TO BE SO LOCATED THAT ANIMALS CANNOT PASS

STANDARD DRAWING

REFERENCE: STANDARD SPEC, SECTION 81

DWG. NO. 78

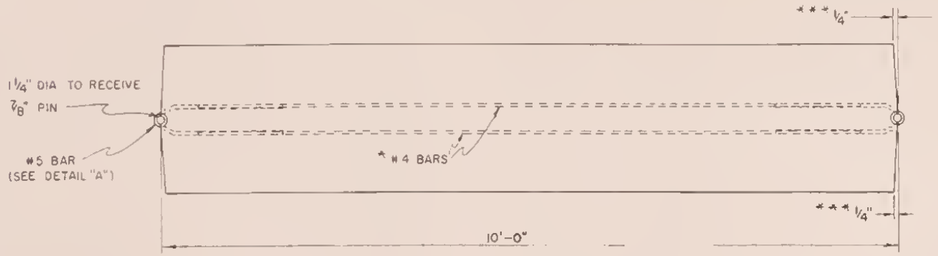
FARM FENCE

| | | |
|---|---|---|
| REVISED | | 12/20/74 |
| EFFECTIVE | 3/1/72 | 2/1/78 |

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS

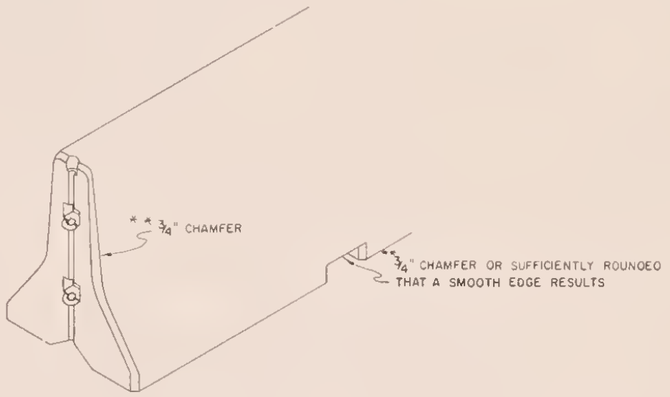
BY _____

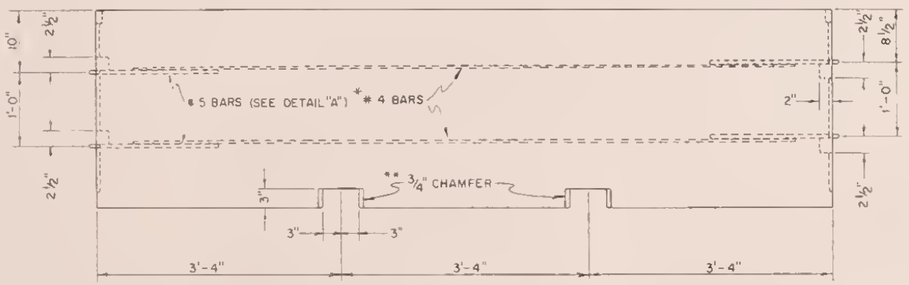
ADMINISTRATOR - ENGINEERING DIVISION



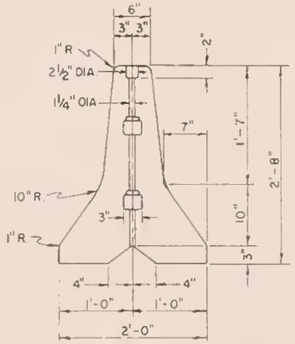

PLAN

* PERMISSABLE ALTERNATE #5 BARS
** 1/2" CHAMFER WILL BE ACCEPTABLE
*** SECTION MAY BE BUILT WITHOUT 1/4" BEVEL

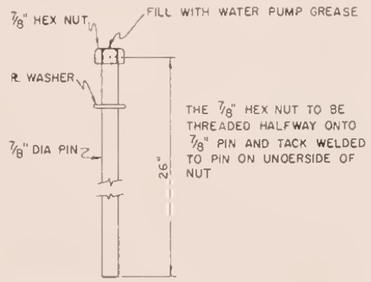



ELEVATION




END VIEW


7/8" HEX NUT
FILL WITH WATER PUMP GREASE
R WASHER
THE 7/8" HEX NUT TO BE THREADED HALFWAY ONTO 7/8" PIN AND TACK WELDED TO PIN ON UNDERSIDE OF NUT
7/8" DIA PIN
26"

CONNECTING PIN DETAIL

## NOTES

CONCRETE SHALL BE CLASS "AD" OR EQUAL.

THE FINISHED SURFACE OF THE BARRIER SHALL BE SMOOTH, DENSE, UNPITTED AND FREE FROM AIR BUBBLE POCKETS, DEPRESSIONS AND HONEY COMB IF THE ENGINEER DEEMS IT NECESSARY, THE BARRIER SHALL BE GIVEN A WOOD FLOAT FINISH IN ORDER TO OBTAIN THE ABOVE MENTIONED FINISH SURFACE.

REINFORCING STEEL SHALL BE MADE OF DEFORMED BARS AND SHALL CONFORM TO A.A.S.H.D. M-137.

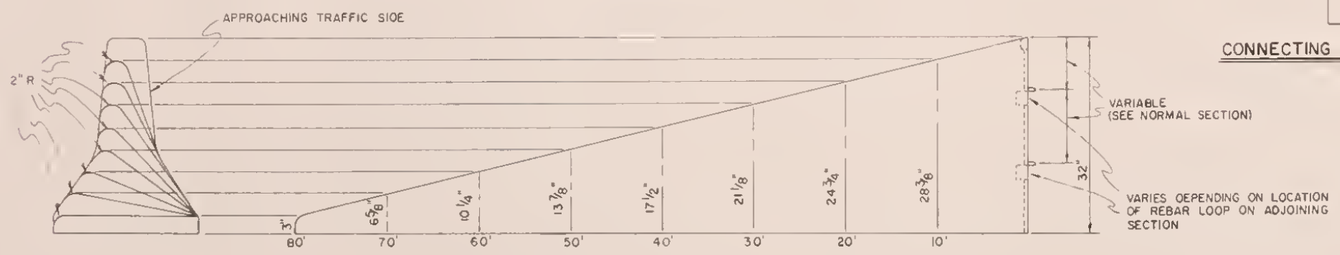
EACH 10' SECTION SHALL BE CONNECTED WITH A 7/8" DIA. x 26" PIN.

THE END TRANSITION SHALL BE A CAST IN PLACE SECTION WITH TRANSVERSE JOINTS PROVIDED AT 20' CENTERS A 1/4" OPEN JOINT EDGED WITH A 1/4" RADIUS TOOL SHALL BE USED. THE CONTRACTOR MAY CHOOSE TO USE EIGHT PRECAST SECTIONS BUT SHALL MAKE PROVISIONS FOR CONNECTING THE SECTIONS TOGETHER AND FOR LIFTING. THIS SHALL BE APPROVED IN WRITING BY THE ENGINEER.

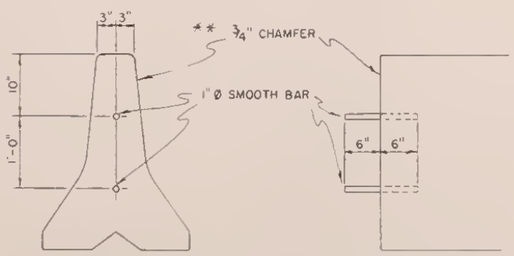
ALL EXPOSED METAL PARTS TO BE PAINTED WITH ONE COAT OF RED LEAD AND TWO COATS OF ALUMINUM PAINT. METAL PARTS ARE CONSIDERED TO INCLUDE THE #5 REINFORCING STEEL, FORMING THE 1 1/4" LOOPS, AND THE CONNECTING PINS.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER FIT-UP OF THE PRECAST CONCRETE MEDIAN BARRIER RAIL. SUFFICIENT PRECAST SECTIONS SHALL BE ASSEMBLED AND PINNED IN THE FABRICATORS PLANT TO DETERMINE THAT PROPER FIT-UP CAN BE MAINTAINED ON ALL ROADWAY ALIGNMENT, CURVES AS WELL AS ON TANGENT. THIS SHALL BE DETERMINED EARLY IN FABRICATION.

## NORMAL SECTION

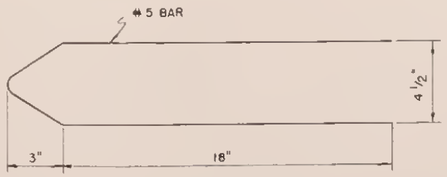



END TRANSITION DETAIL




MODIFIED END FOR BRIDGE CONNECTION

NOTE: THE #5 BAR SHOWN BELOW CAN BE EXTENDED FROM THE FACE OF CONCRETE TO PROVIDE A 1" GAP BETWEEN THE PRECAST SECTIONS.




DETAIL "A"

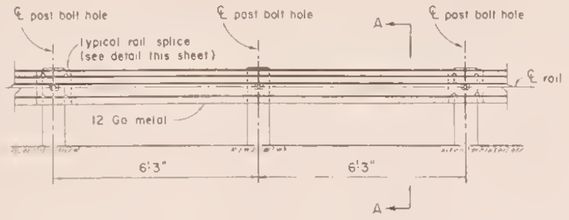
| STANDARD DRAWING | |
|---|---|
| REFERENCE STANDARD SPEC. SECTION | DWG. NO. B4 |

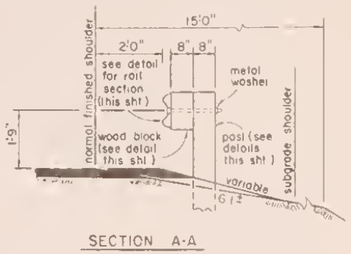
CONCRETE
MEDIAN RAIL

APPROVED M.J. ANDERSON, DIRECTOR OF HIGHWAYS
BY [signature]
ADMINISTRATOR-ENGINEERING DIVISION

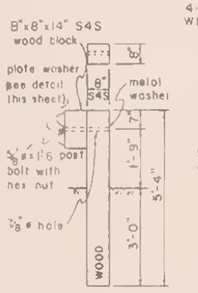
| | |
|---|---|
| REVISED | 12/20/74 |
| EFFECTIVE | 2/1/75 |

# METAL GUARD RAIL

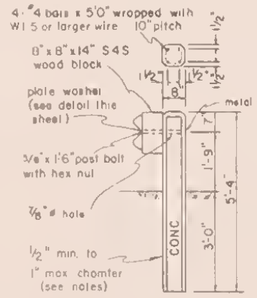


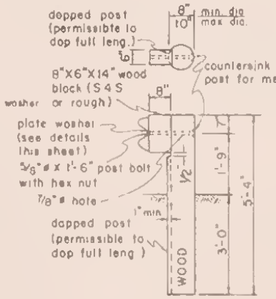

SECTION A-A



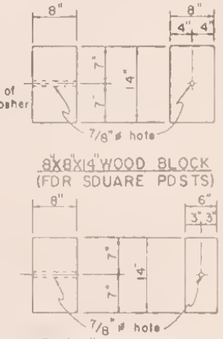

SQUARE WOOD POST




CONCRETE POST


dapped post (permissible to dap full leng.)
8" min. dia. 10" max. dia.
8"X6"X14" wood block (S4S or rough)
countersink back of post for metal washer
plate washer (see details this sheet)
⅝"ø x 1'-6" post bolt with hex nut
⅞" ø hole
1" min.
dapped post (permissible to dap full leng.)
WOOD
1'-9"
1'-9"
3'-0"
5'-4"

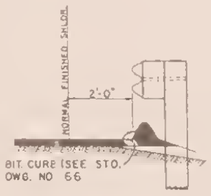
ROUND WOOD POST



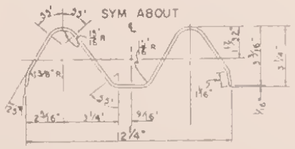

8"x8"x14" WOOD BLOCK (FOR SQUARE POSTS)

8"x6"x14" WOOD BLOCK (FOR ROUND POSTS)

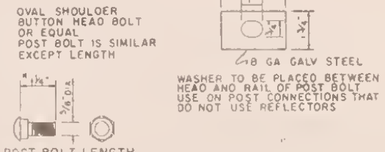
## DETAIL OF GUARD RAIL POSTS




BITUM. CURB WITH GUARD RAIL

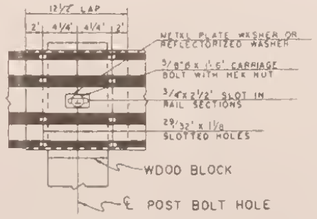



RAIL SECTION


OVAL SHOULDER BUTTON HEAD BOLT OR EQUAL POST BOLT IS SIMILAR EXCEPT LENGTH
POST BOLT LENGTH
GUARD RAIL - 1'6"
MEDIAN RAIL - 2'2"
3"
3"
18 GA GALV STEEL
WASHER TO BE PLACED BETWEEN HEAD AND RAIL OF POST BOLT USE ON POST CONNECTIONS THAT DO NOT USE REFLECTORS

SPLICE BOLT & NUT

PLATE WASHER DETAIL


12½" LAP
2' 4¼" 4¼" 12"
METAL PLATE WASHER OR REFLECTORIZED WASHER
⅝"ø x 1'-6" CARRIAGE BOLT WITH HEX NUT
¾" x 2½" SLOT IN RAIL SECTIONS
29/32" x 1⅛" SLOTTED HOLES
WOOD BLOCK
℄ POST BOLT HOLE

RAIL SPLICE DETAIL
(LAP IN DIRECTION OF TRAFFIC)

## NOTES

RAIL: GALVANIZED RAIL SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM A 525 OR ASTM A 123. STEEL RAIL SHALL CONFORM TO AASHO M 180. ALL RAIL PLATES ARE TO BE LAPPED IN DIRECTION OF TRAFFIC.

POSTS: ROUND POSTS SHALL HAVE NO DIAMETER LESS THAN 8" OR MORE THAN 10". ONLY ONE TYPE POST (SQUARE OR ROUND) TO BE USED WITHIN ONE PROJECT.

TERMINAL SECTIONS: SEE STANDARD DRAWING NO. 89 FOR APPROACH AND DEPARTURE TERMINAL SECTIONS.

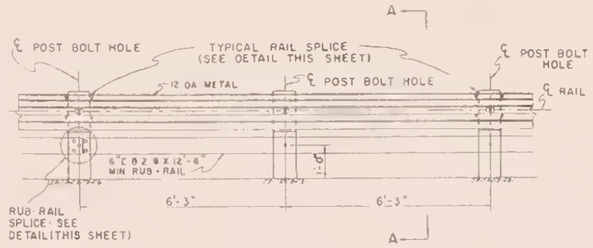
BRIDGE APPROACH: SEE STANDARD DRAWING NO. 86 FOR TREATMENT AT BRIDGE ENDS.

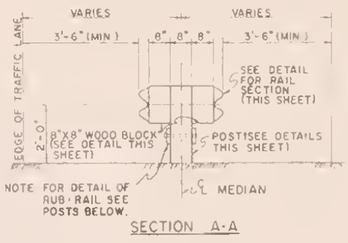
REFLECTOR-WASHER: ALL SECTIONS OF GUARD RAIL SHALL HAVE REFLECTOR WASHERS SPACED EVERY 25 FT. REFLECTOR WASHERS TO BE INCLUDED IN THE UNIT PRICE PER LINEAR FOOT OF GUARD RAIL. SEE DETAIL THIS SHEET.

FITTINGS: ALL FITTINGS SHALL BE GALVANIZED TO CONFORM WITH STANDARD SPEC. M-220.01.

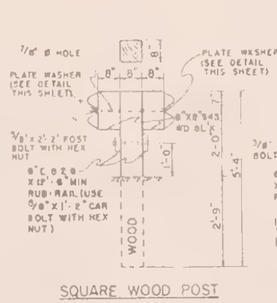
CONCRETE POSTS: ONLY ONE SIZE CHAMFER CAN BE USED IN A SINGLE RUN OF RAIL.

# METAL MEDIAN RAIL

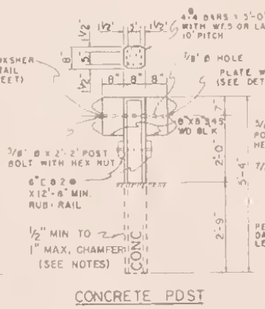


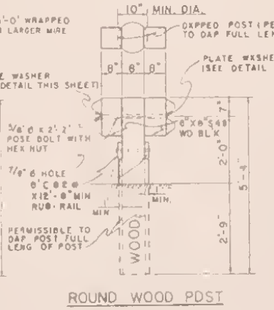

SECTION A-A


⅞" ø HOLE
PLATE WASHER (SEE DETAIL THIS SHEET)
8" 8" 8"
⅝" x 2'-2" POST BOLT WITH HEX NUT
6"C 8.2 @ X 12'-6" MIN RUB-RAIL (USE ⅝"ø x 1'-2" CAR BOLT WITH HEX NUT)
WOOD
2'-0"
5'-4"
2'-9"

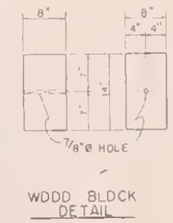
SQUARE WOOD POST


4-#4 BARS x 3'-0" WRAPPED WITH WF.5 OR LARGER WIRE 10" PITCH
⅞" ø HOLE
PLATE WASHER (SEE DETAIL THIS SHEET)
8"X8"S4S WD BLK
⅜" ø x 2'-2" POST BOLT WITH HEX NUT
6"C 8.2 @ X 12'-6" MIN. RUB-RAIL
½" MIN TO 1" MAX. CHAMFER (SEE NOTES)
CONC
2'-0"
5'-4"
2'-9"

CONCRETE POST

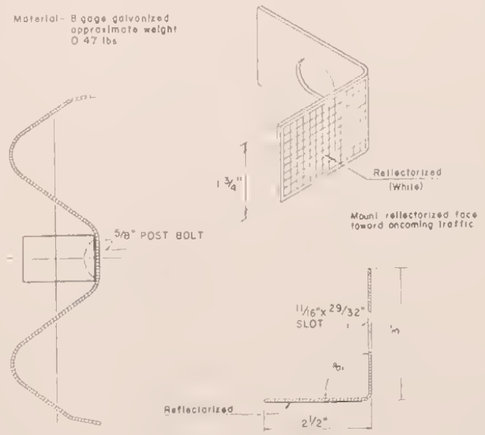



ROUND WOOD POST

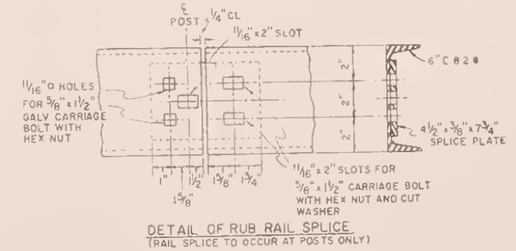



WDDD BLOCK DETAIL

## DETAIL OF GUARD RAIL POSTS



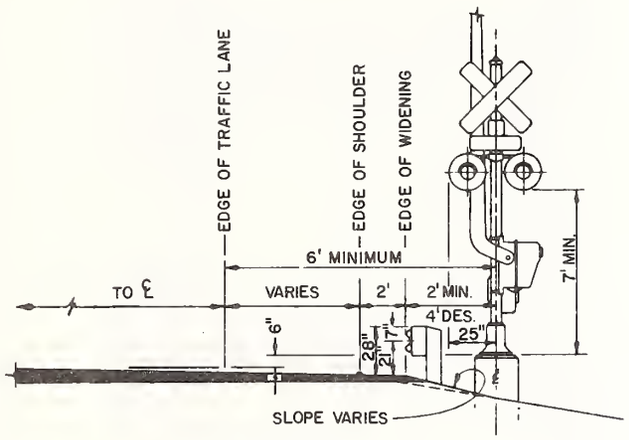

REFLECTOR-WASHER


℄ POST
¼" CL
11/16" x 2" SLOT
6"C 8.2 @
11/16" ø HOLES FOR ⅝" x 1½" GALV CARRIAGE BOLT WITH HEX NUT
4½" x ⅜" x 7¾" SPLICE PLATE
11/16" x 2" SLOTS FOR ⅝" x 1½" CARRIAGE BOLT WITH HEX NUT AND CUT WASHER

DETAIL OF RUB RAIL SPLICE
(RAIL SPLICE TO OCCUR AT POSTS ONLY)

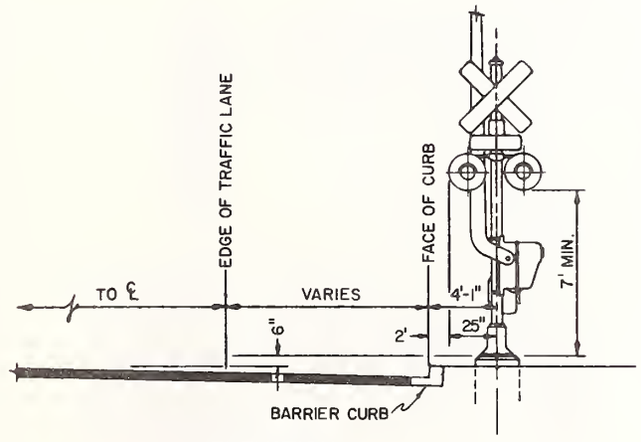
| STANDARD DRAWING | |
|---|---|
| REFERENCE: STANDARD SPEC. SECTION 90 | DWG NO. 85 |
| METAL GUARD AND MEDIAN RAIL | |
| APPROVED H J ANDERSON DIRECTOR OF HIGHWAYS BY ADMINISTRATOR - ENGINEERING DIVISION | |

| | | | |
|---|---|---|---|
| REVISED | | 12/20/74 | |
| EFFECTIVE | 3/1/72 | 2/1/73 | |

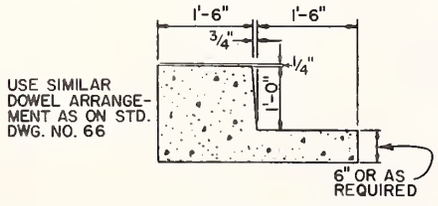



ELEVATION

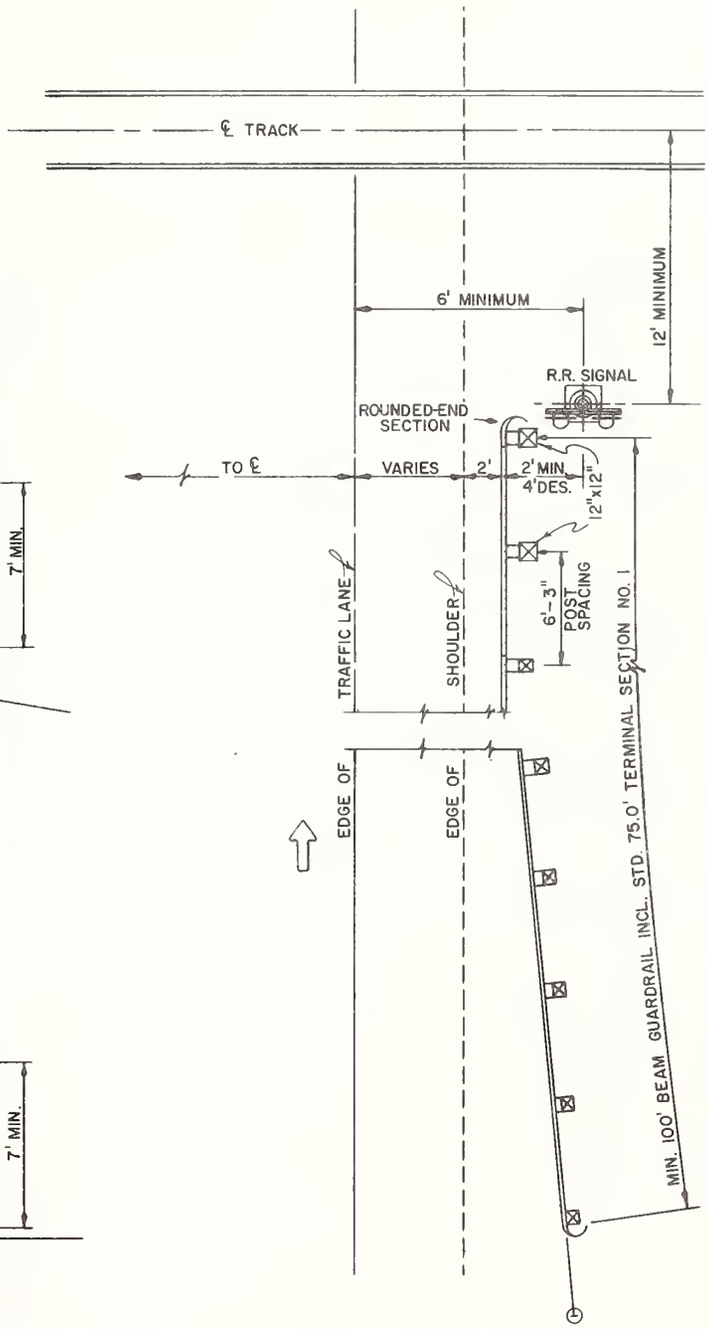
IN EVERY CASE WHERE THERE IS NO BARRIER TYPE CURB, GUARDRAIL SHALL BE INSTALLED UNLESS SUCH INSTALLATION IS FOUND TO BE IMPRACTICAL.




ELEVATION




TYPICAL BARRIER CURB




PLAN

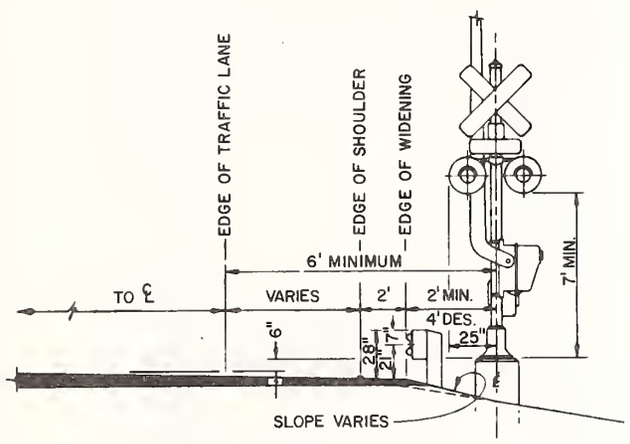
SEE BULLETIN NO. 7, "RECOMMENDED PRACTICES FOR RAILROAD-HIGHWAY GRADE CROSSING PROTECTION," ASSOCIATION OF AMERICAN RAILROADS, FOR ADDITIONAL DETAILS & SKEWED CROSSINGS.

SEE STD. DWG. NO. 89 FOR TERMINAL SECTION DETAILS.

| STANDARD DRAWING | |
|---|---|
| REFERENCE: STANDARD SPEC. SECTION 90 | DWG. NO. 88 |
| GUARDRAIL FOR GRADE CROSSING PROTECTION | |

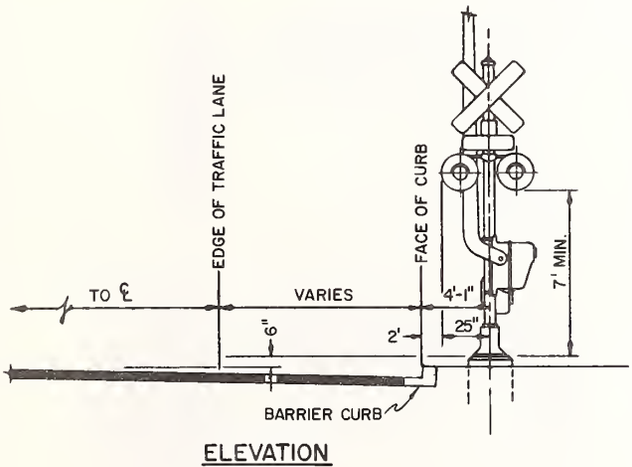
| | | | |
|---|---|---|---|
| REVISED | | 12/20/74 | |
| EFFECTIVE | 3/1/72 | 2/1/75 | |

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: _____
ADMINISTRATOR - ENGINEERING DIVISION

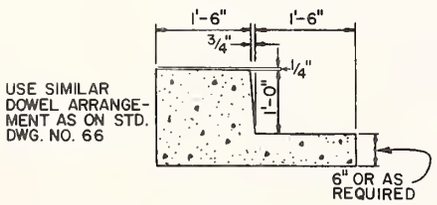



ELEVATION

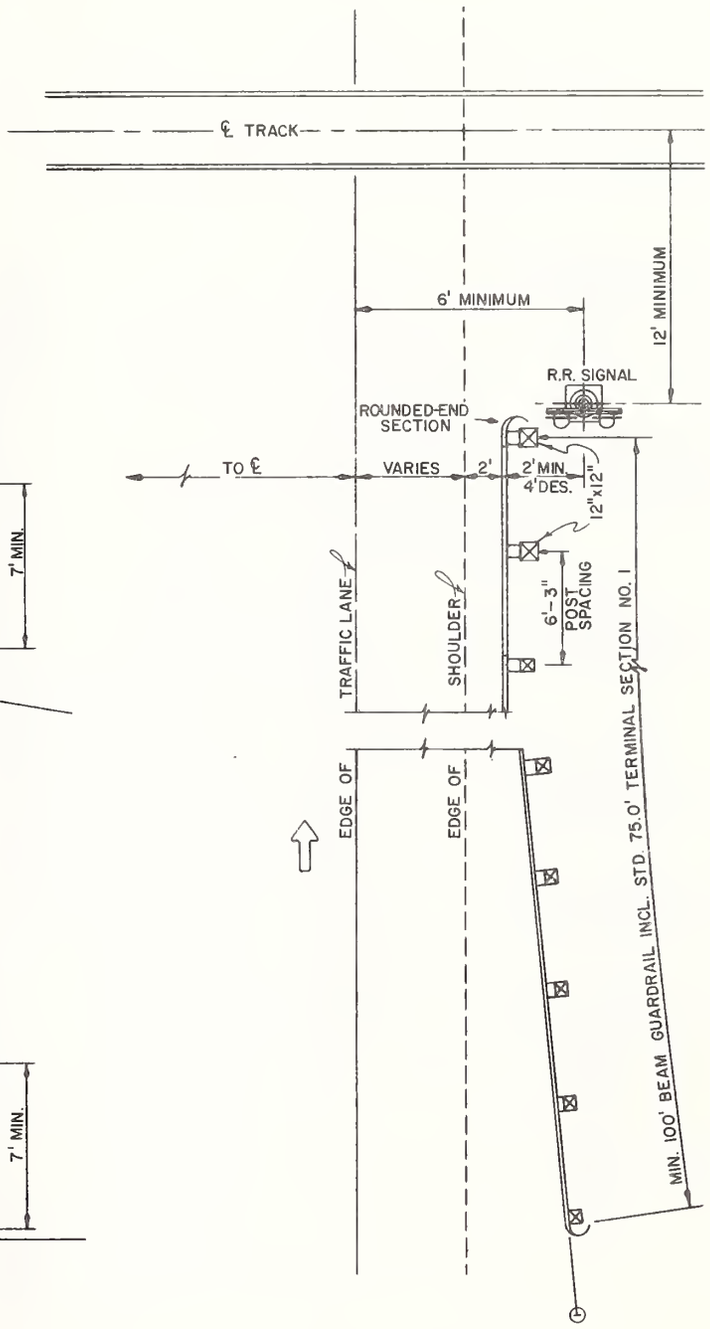
IN EVERY CASE WHERE THERE IS NO BARRIER TYPE CURB, GUARDRAIL SHALL BE INSTALLED UNLESS SUCH INSTALLATION IS FOUND TO BE IMPRACTICAL.




ELEVATION




TYPICAL BARRIER CURB




PLAN

SEE BULLETIN NO. 7, "RECOMMENDED PRACTICES FOR RAILROAD-HIGHWAY GRADE CROSSING PROTECTION", ASSOCIATION OF AMERICAN RAILROADS, FOR ADDITIONAL DETAILS & SKEWED CROSSINGS.

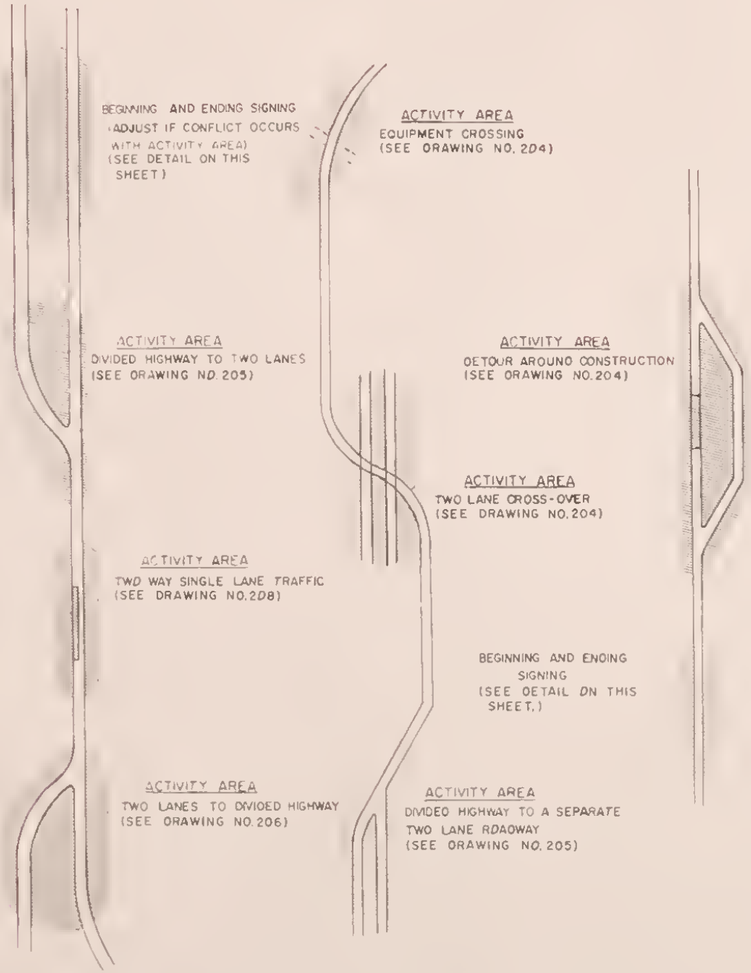
SEE STD. DWG. NO. 89 FOR TERMINAL SECTION DETAILS.

| STANDARD DRAWING | |
|---|---|
| REFERENCE: STANDARD SPEC. SECTION 90 | DWG. NO. 88 |

GUARDRAIL FOR GRADE CROSSING PROTECTION

| | | |
|---|---|---|
| REVISED | | 12/20/74 |
| EFFECTIVE | 3/1/72 | 2/1/75 |

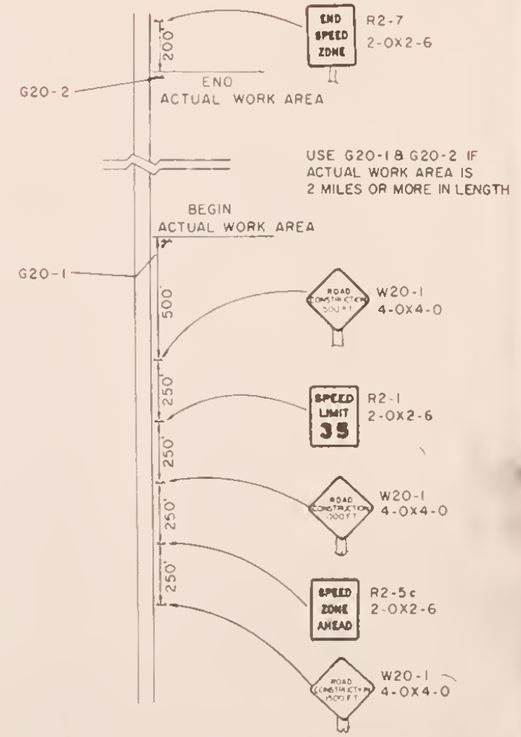
APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: [signature]
ADMINISTRATOR - ENGINEERING DIVISION




PLAN OF TYPICAL CONSTRUCTION AREAS

## GENERAL NOTES

1. NO CONSTRUCTION SHALL COMMENCE ON THE PROJECT UNTIL NECESSARY CONSTRUCTION WARNING SIGNS ARE IN PLACE AND APPROVED BY THE ENGINEER.
2. ALL SIGNS AND BARRICADES REQUIRED FOR A CONSTRUCTION PROJECT (EXCEPT AS NOTED) SHALL BE FURNISHED AND INSTALLED BY THE CONTRACTOR
3. WHEN SPEED CONTROL APPEARS NECESSARY FOR THE PROTECTION OF THE TRAVELING PUBLIC, SUCH SPEED CONTROL SHALL BE REQUESTED BY THE CONTRACTOR IN WRITING, TO THE ENGINEER.
4. ROUTE MARKERS SHOULD BE USED ON EXCEPTIONALLY LONG PROJECTS. THESE WILL BE FURNISHED BY AND REMAIN THE PROPERTY OF THE MONTANA DEPARTMENT OF HIGHWAYS. THE SIGNS SHALL BE INSTALLED BY THE CONTRACTOR AT THE LOCATION DETERMINED BY THE ENGINEER.
5. EXCEPT AS NOTED ON THESE PLANS, ALL SIGNS WILL CONFORM TO THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS", LATEST EDITION, PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION.
6. ALL SIGN LOCATIONS ARE APPROXIMATE AND SHOULD BE ADJUSTED TO FIT FIELD CONDITIONS
7. DETAILED LAYOUTS OF ALL SIGNS WILL BE FURNISHED BY THE TRAFFIC UNIT OF THE MONTANA DEPARTMENT OF HIGHWAYS UPON REQUEST.
8. THE DETERMINATION OF THE APPROPIATE SIGNING STANDARD TO BE USED FOR A PARTICULAR WORK AREA SHALL BE DETERMINED BY THE ENGINEER.
9. FOR SIGNS LARGER THAN THOSE DETAILED IN FEDERAL HIGHWAY ADMINISTRATION MANUAL, "STANDARD HIGHWAY SIGNS", (1972), AND THE MONTANA DEPARTMENT OF HIGHWAYS, "STANDARD DRAWINGS", THE LEGEND WILL BE INCREASED IN SIZE PROPORTIONATELY.



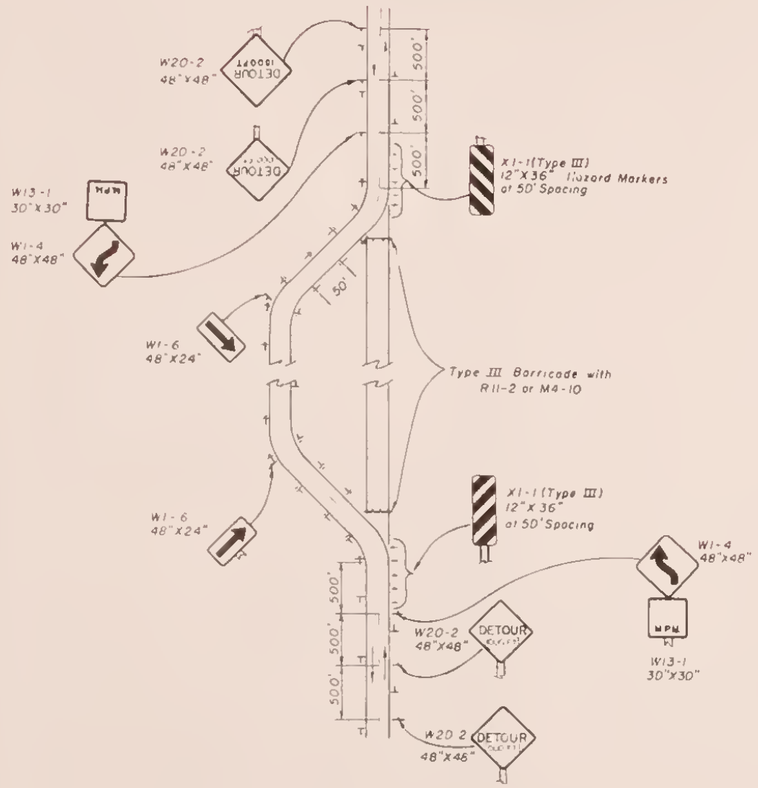

CONSTRUCTION AREA
BEGINNING AND ENDING SIGNING

STANDARD DRAWING

| REFERENCE | DWG. NO. |
|---|---|
| STANDARD SPEC SECTION NONE | 203 |

CONSTRUCTION SIGNING STANDARDS

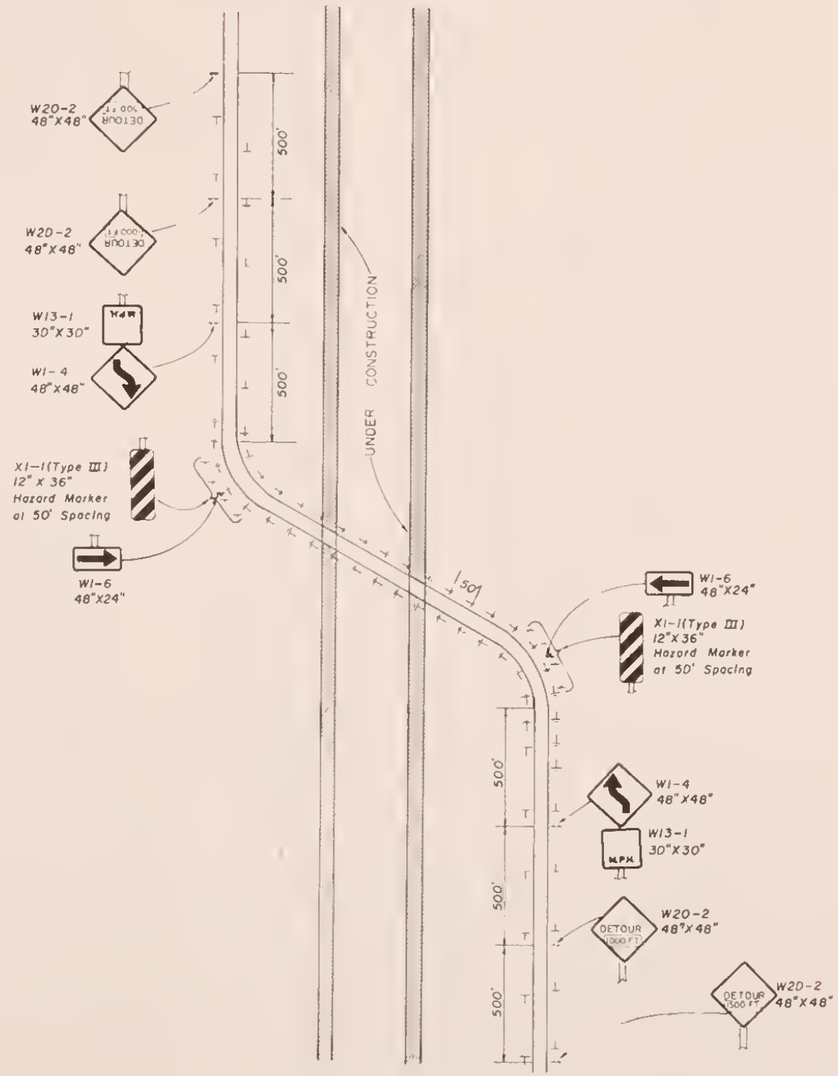
| | | | | |
|---|---|---|---|---|
| REVISED | | 4/1/73 | 10/18/72 | APPROVED [illegible] ANDERSON-DIRECTOR OF HIGHWAYS |
| EFFECTIVE | 2/1/72 | 4/24/73 | 2/1/73 | BY [illegible] ADMINISTRATOR-ENGINEERING DIVISION |



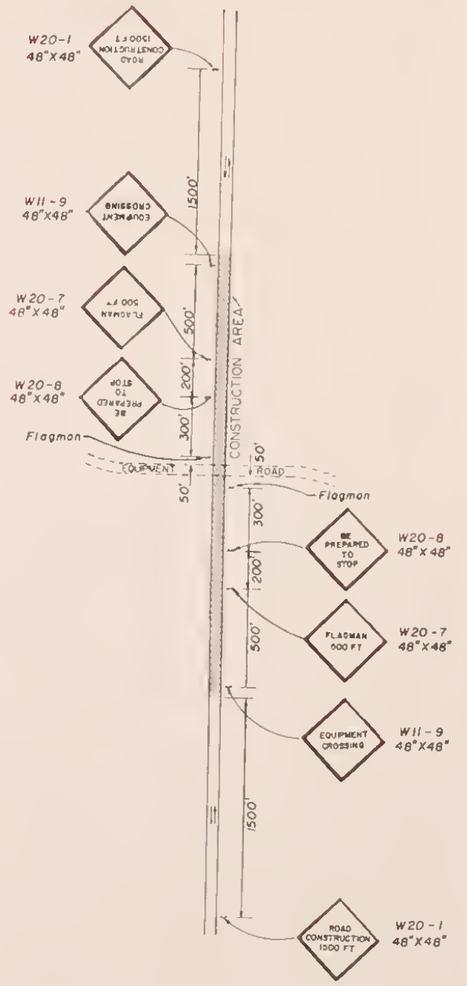

NOTES

1. USE STANDARD SPACING FOR DELINEATORS ON 2 AND 4 LANE ROADS AS SHOWN IN THE STANDARD SHEETS CONSTRUCTION TRANSITIONS SHOULD BE MARKED WITH DESIGN "B" DELINEATORS WITH 50' SPACING AS INDICATED.
2. ALL SIGN SPACINGS ARE APPROXIMATE AND SHOULD BE ADJUSTED TO FIT FIELD CONDITIONS
3. FOR DESIGN DETAILS OF SIGNS, SEE FEDERAL HIGHWAY ADMINISTRATION "STANDARD HIGHWAY SIGNS," 1972 EDITION.
4. EXISTING STRIPING IS TO BE OBLITERATED WHERE IT CONFLICTS WITH TRAFFIC MOVEMENTS ON DETOUR
5. DETAILED LAYOUTS OF ALL SIGNS WILL BE FURNISHED BY THE TRAFFIC UNIT OF THE MONTANA DEPARTMENT OF HIGHWAYS UPON REQUEST
6. X1-1 HAZARD MARKERS AT 50' SPACING, BARRICADES AS SHOWN.
7. SEE SPECIAL PROVISIONS FOR REQUIREMENTS FOR PAVEMENT MARKINGS.

DETOUR AROUND CONSTRUCTION




TWO LANE CROSS-OVER




EQUIPMENT CROSSING
IN CONSTRUCTION AREA

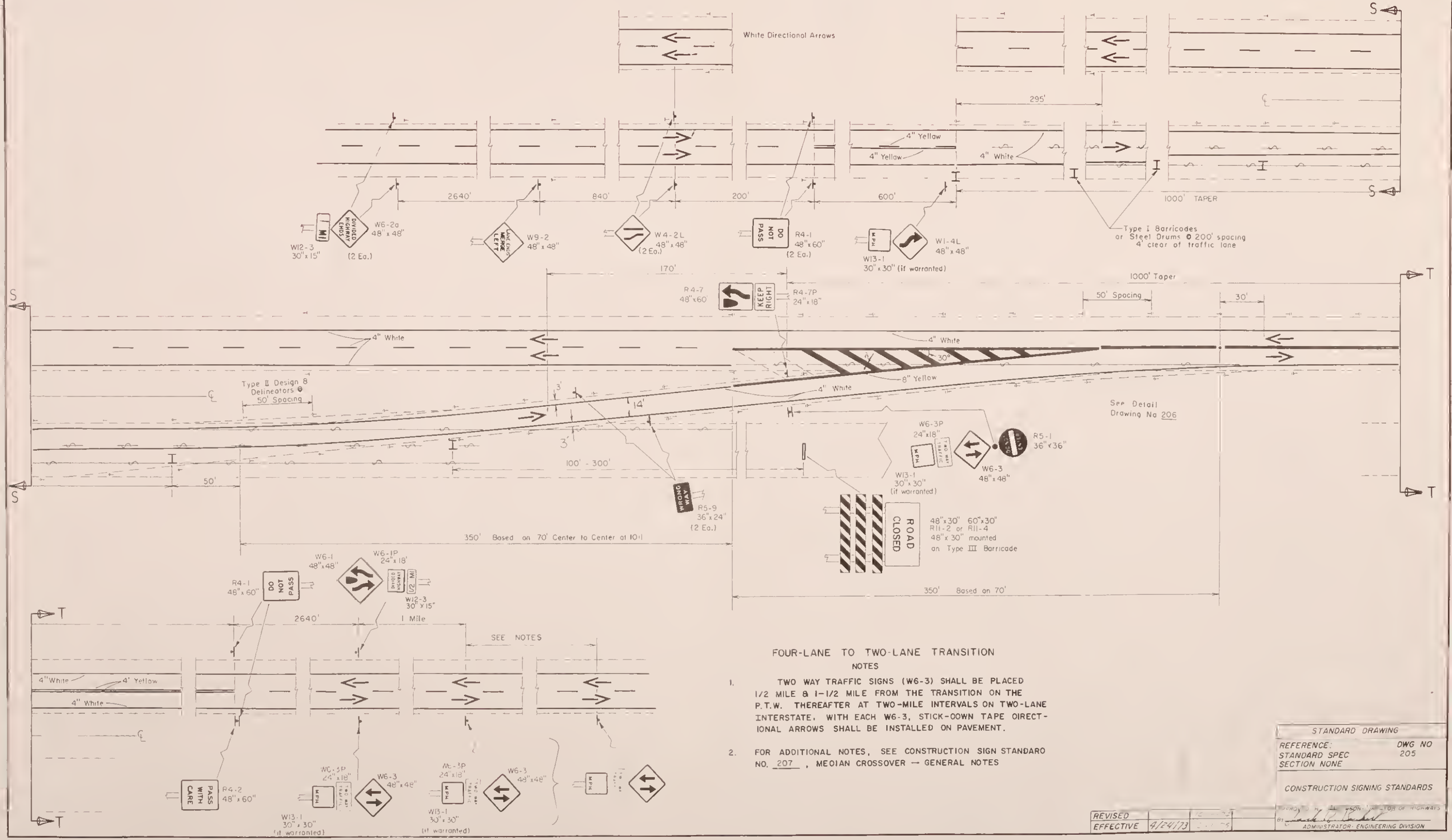
STANDARD DRAWING

REFERENCE: STANDARD SPEC. SECTION NONE

DWG. NO. 204

CONSTRUCTION SIGNING STANDARDS

| | | | | |
|---|---|---|---|---|
| REVISED | | 4/1/73 | 10.18 ~3 | APPROVED H. ANDERSON-DIRECTOR OF HIGHWAYS |
| EFFECTIVE | 2/1/72 | 4/24/73 | 2-1.75 | BY ADMINISTRATOR-ENGINEERING DIVISION |




## FOUR-LANE TO TWO-LANE TRANSITION

NOTES

1. TWO WAY TRAFFIC SIGNS (W6-3) SHALL BE PLACED 1/2 MILE & 1-1/2 MILE FROM THE TRANSITION ON THE P.T.W. THEREAFTER AT TWO-MILE INTERVALS ON TWO-LANE INTERSTATE. WITH EACH W6-3, STICK-DOWN TAPE DIRECTIONAL ARROWS SHALL BE INSTALLED ON PAVEMENT.

2. FOR ADDITIONAL NOTES, SEE CONSTRUCTION SIGN STANDARD NO. 207 , MEDIAN CROSSOVER — GENERAL NOTES

STANDARD DRAWING

REFERENCE: STANDARD SPEC SECTION NONE

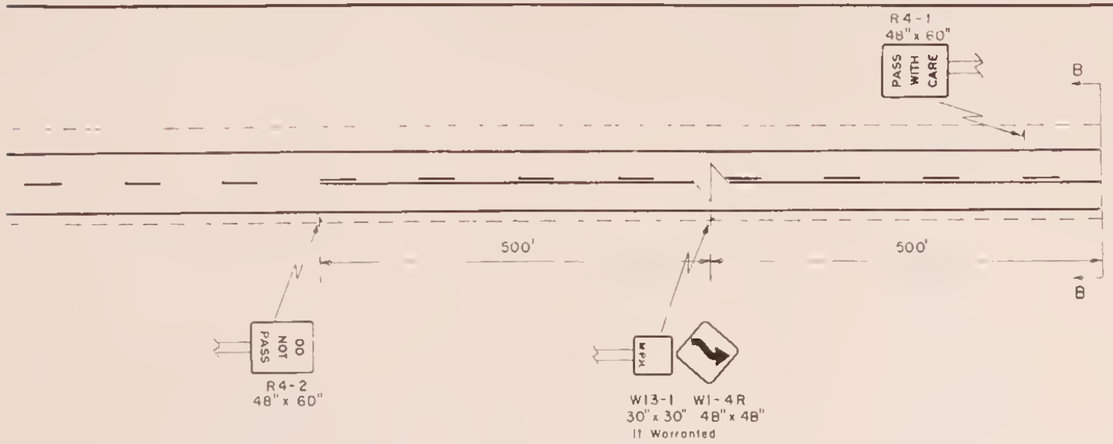
DWG NO 205

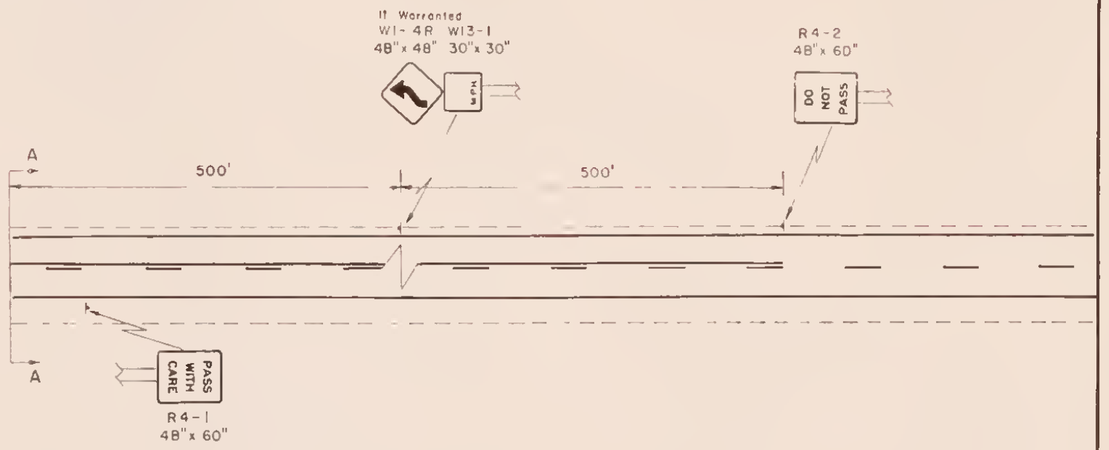
CONSTRUCTION SIGNING STANDARDS

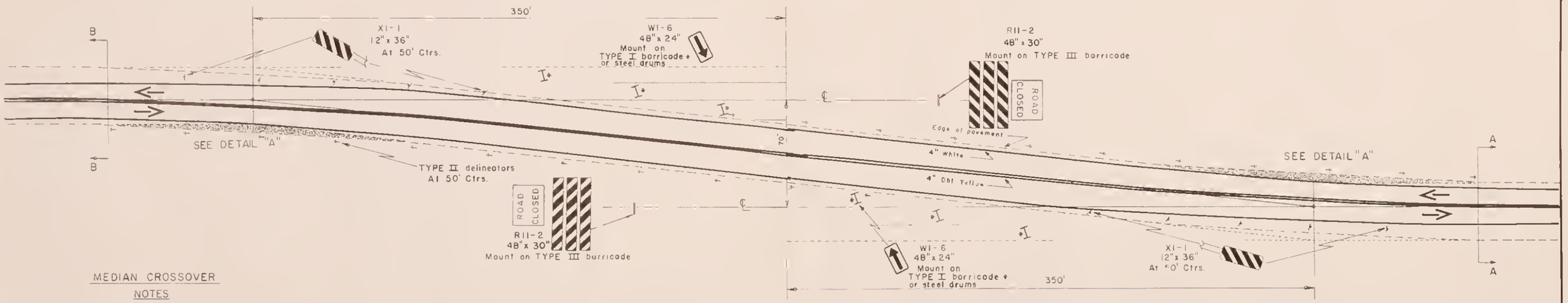
APPROVED: DIRECTOR OF HIGHWAYS

BY: ADMINISTRATOR, ENGINEERING DIVISION

| | | |
|---|---|---|
| REVISED | | |
| EFFECTIVE | 4/24/73 | |

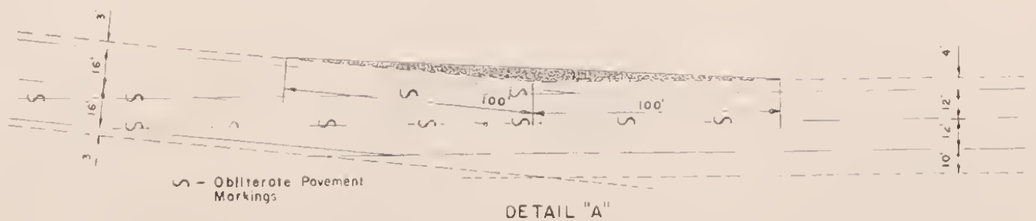



## MEDIAN CROSSOVER NOTES

1. TEMPORARY PAVEMENT MARKINGS SHALL BE OF A TYPE TO FACILITATE REMOVAL WHEN NO LONGER NECESSARY. EXISTING PAVEMENT MARKINGS THAT CONFLICT WITH PROPOSED TRAFFIC MOVEMENT ARE TO BE OBLITERATED BY SANDBLASTING, BURNING, PAINTING OR OTHER SUITABLE MEANS.
2. DELINEATORS TO BE SPACED AS SHOWN.
3. FOR SIGN MOUNTING DETAILS SEE CONSTRUCTION SIGNING STANDARD DRAWING NO. 209
4. DISTANCES FOR SIGN SPACINGS ARE APPROXIMATE ONLY AND ARE MEANT AS A GUIDE FOR UNIFORMITY AND STANDARDIZATION. USE JUDGEMENT AND REASONABLE TOLERANCE FOR SIGN INSTALLATION.
5. CROSSOVER TAPER SHALL BE 1 TO 10 DESIRABLE 1 TO 8 MINIMUM
6. SUGGESTED SUPER OF CURVE TO BE 0.02 FT/FT MINIMUM.




DETAIL "A"

| STANDARD DRAWING | |
|---|---|
| REFERENCE STANDARD SPEC SECTION NONE | DWG NO 207 |
| CONSTRUCTION SIGNING STANDARDS | |

| | | |
|---|---|---|
| REVISED | | 10/9-74 |
| EFFECTIVE | 4/24/13 | 2/1/75 |

APPROVED FOR ANDERSON-DIRECTOR OF HIGHWAYS
BY
ADMINISTRATOR-ENGINEERING DIVISION

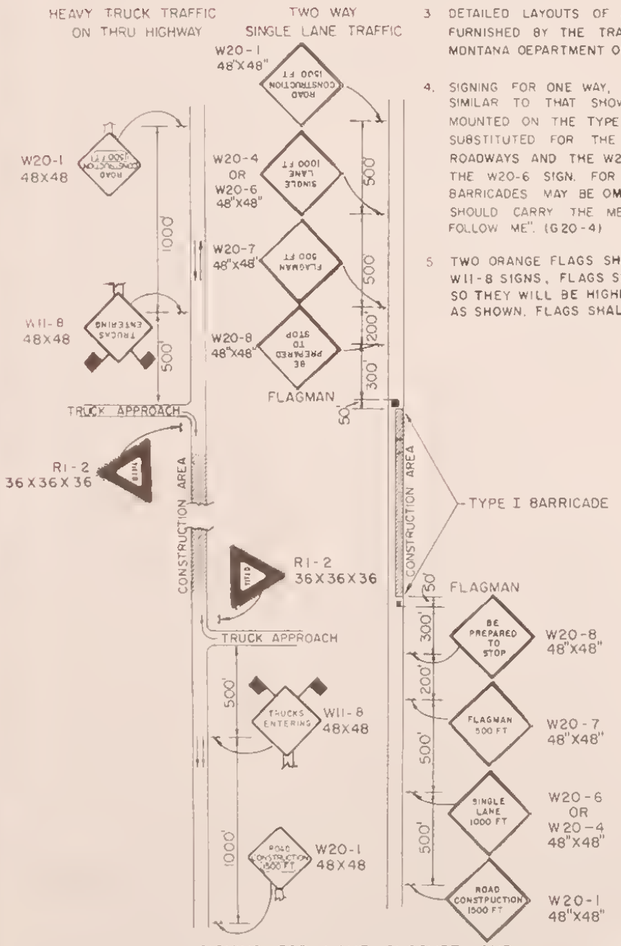
1. ALL SIGN SPACINGS ARE APPROXIMATE AND SHOULD BE ADJUSTED TO FIT FIELD CONDITIONS.

2. FOR DESIGN DETAILS OF SIGNS, SEE FEDERAL HIGHWAY ADMINISTRATION "STANDARD HIGHWAY SIGNS" MANUAL, 1972 EDITION.

3 DETAILED LAYOUTS OF ALL SIGNS WILL BE FURNISHED BY THE TRAFFIC UNIT OF THE MONTANA DEPARTMENT OF HIGHWAYS UPON REQUEST

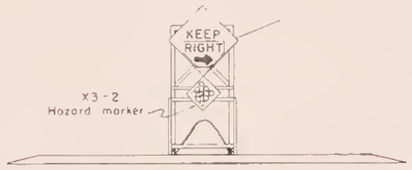
4. SIGNING FOR ONE WAY, SINGLE LANE TRAFFIC IS SIMILAR TO THAT SHOWN. W1-6 ARROW MOUNTED ON THE TYPE I BARRICADES MAY BE SUBSTITUTED FOR THE FLAGMAN FOR ONE WAY ROADWAYS AND THE W20-7 SIGN REPLACED WITH THE W20-6 SIGN. FOR PILOT CAR OPERATION BARRICADES MAY BE OMITTED. THE VEHICLE SHOULD CARRY THE MESSAGE, "PILOT CAR FOLLOW ME". (G20-4)

5 TWO ORANGE FLAGS SHALL BE MOUNTED ON ALL W11-8 SIGNS, FLAGS SHALL BE MOUNTED SO THEY WILL BE HIGHER THAN SIGN FACE AS SHOWN. FLAGS SHALL BE 12"X12" MINIMUM.

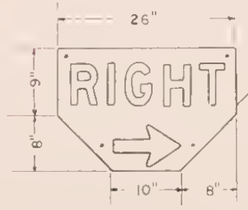


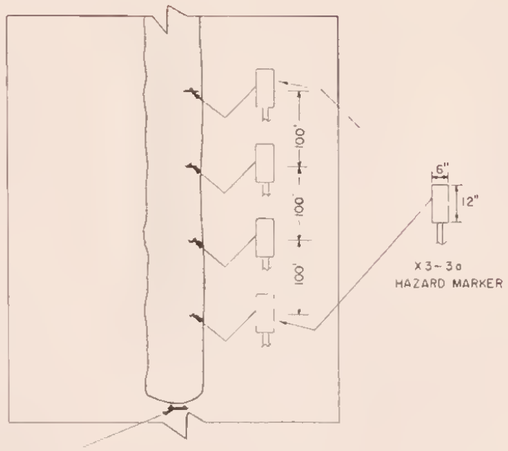

SIGNING FOR LANE CLOSURE AND SIDE ROAD APPROACH

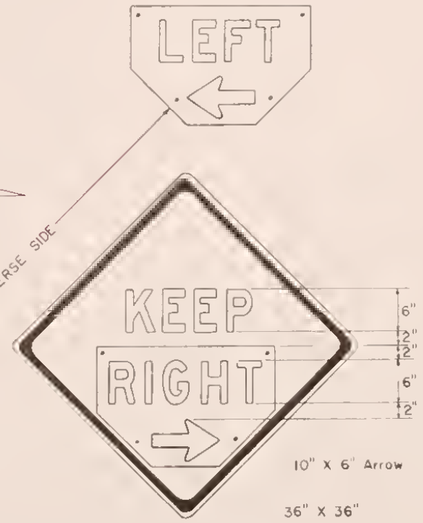
NOTE SEE STANDARD DRAWING NO. 209 FOR TYPICAL PORTABLE SIGN MOUNTING.




NOTE 26" X 17" sheet aluminum plate with black legend on reflectorized orange background Legend shall conform to F.H.W.A. Standard Alphabets.
Metal plate shall be attached with 4 metal screws.



W20-8
48"x 48"

## TYPICAL WINDROW SIGNING

The cost of furnishing, placing and handling windrow signs and delineation shall be absorbed in the price bid for various items requiring windrow signing.

STANDARD DRAWING

REFERENCE: STANDARD SPEC. SECTION NONE

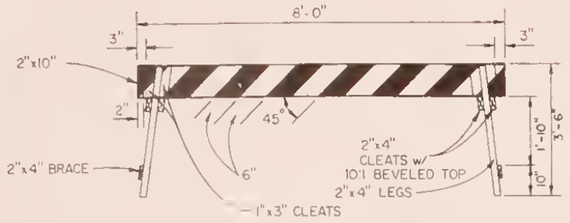
DWG. NO. 208

CONSTRUCTION SIGNING STANDARDS-SIDE APPROACH, LANE CLOSING AND WINDROW SIGNING

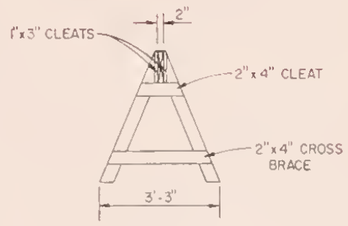
APPROVED: R.J. ANDERSON-DIRECTOR OF HIGHWAYS
BY: A. [illegible]
ADMINISTATOR-ENGINEERING DIVISION

| | | | | |
|---|---|---|---|---|
| REVISED | | 4/1/73 | 10/8/74 | |
| EFFECTIVE | 2/1/72 | 4/24/73 | 2/1/75 | |

# TYPE I BARRICADE

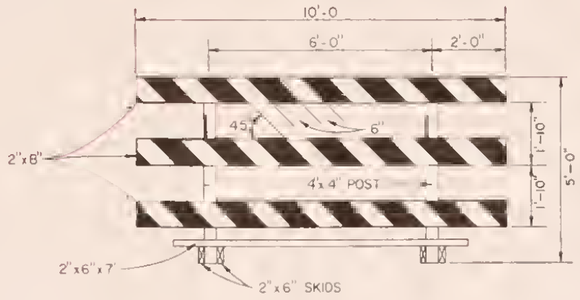



FRONT VIEW

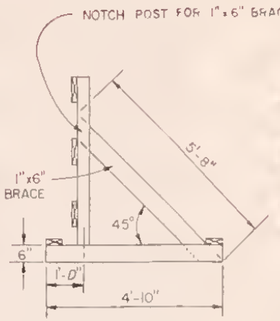



END VIEW

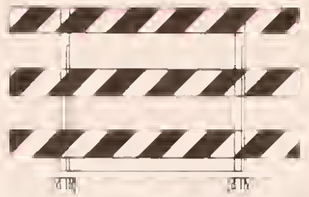
# TYPE III BARRICADE




FRONT VIEW

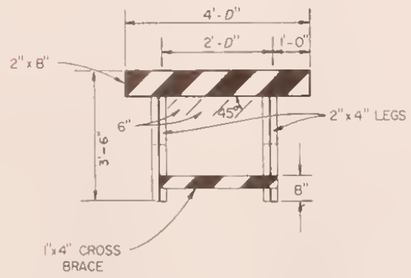



END VIEW

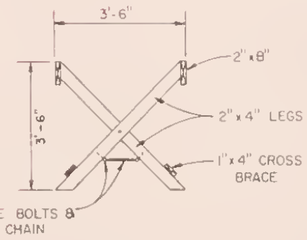


REAR VIEW

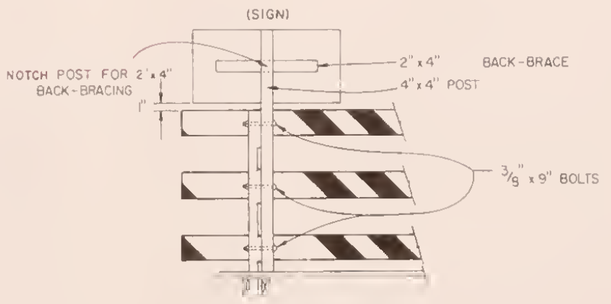
# TYPE II BARRICADE




FRONT VIEW




END VIEW



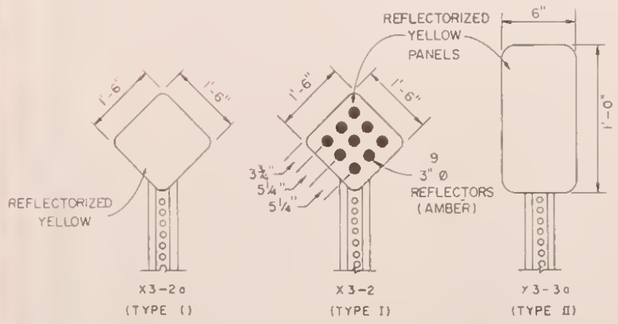

REAR VIEW

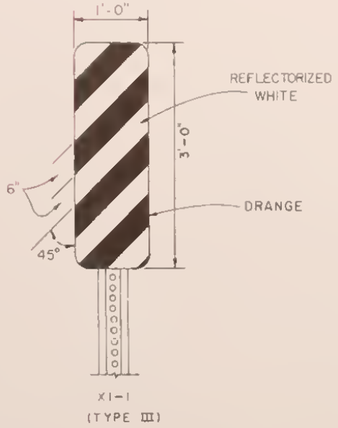
## SIGN MOUNTING

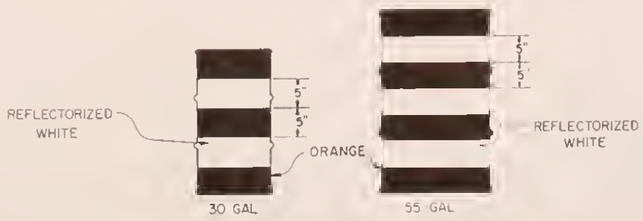
NOTES: BARRICADES

1. ALL BARRICADES SHALL HAVE ALTERNATING ORANGE AND REFLECTIVE WHITE STRIPES, 6" IN WIDTH AT AN ANGLE OF 45° AS SHOWN. THE STRIPES SHALL SLOPE DOWNWARD TOWARD THE SIDE TRAFFIC IS TO PASS, BOTH FRONT AND BACK.
2. ALL BARRICADES SHALL BE REFLECTORIZED WITH SILVER SHEETING MOUNTED ON A SHEET ALUMINUM BACKING AT LEAST 0.019" THICK ALUMINUM ALLOY 6061-T6 CONFORMING TO A.S.T.M. DESIGNATION B-209 SHALL BE USED. THIS REFLECTIVE ALUMINUM SHEETING SHALL BE SECURED WITH ALUMINUM NAILS.
3. BARRICADES, INCLUDING FRAMEWORK, SHALL BE PAINTED WITH 2 COATS OF WHITE PAINT ACCORDING TO SECTION M-280.02, (4 & B) STANDARD SPECIFICATIONS.
4. SANDBAGS OF SUFFICIENT WEIGHT SHALL BE USED TO HOLD BARRICADE IN PLACE.
5. BARRICADES SHALL BE CONSTRUCTED OF STANDARD GRADE (NO. 2) OR BETTER S4S LUMBER. USE 3/8" CARRIAGE BOLTS FOR ALL CONNECTIONS.

# HAZARD MARKERS



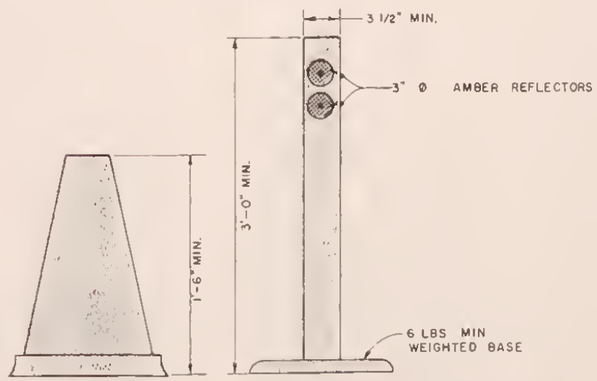




## DRUMS

1 PAINTED AS SHOWN, AND ACCORDING TO SECTION M-280.02, STANDARD SPECIFICATIONS, 1970.

2 FILL, NOT TO EXCEED 1/4 OF DRUM, WITH SAND TO HOLD DRUM UPRIGHT AND IN PLACE.




## CONES

FLUORESCENT ORANGE
STANDARD DESIGN

## FLEXIBLE GUIDE POST

FLUORESCENT ORANGE
AS APPROVED BY
PROJECT MANAGER

STANDARD DRAWING

REFERENCE STANDARD SPEC. SECTION NONE

DWG. NO. 210

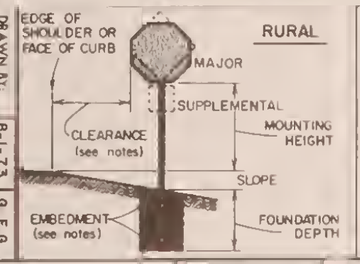
CONSTRUCTION SIGNING STANDARDS - BARRICADES

APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS

BY _____ ADMINISTRATOR - ENGINEERING DIVISION

| | | | | |
|---|---|---|---|---|
| REVISED | | | | 10/8/76 |
| EFFECTIVE | 2/1/72 | 1/1/73 | 2/1/75 | |

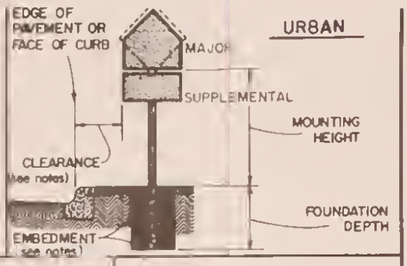
CHECKED BY: C H L | DRAWN BY: G. E.Q. | 8-1-73 | 8-8-73




# TYPICAL ERECTION SPECIFICATION STANDARDS

## PRIMARY & SECONDARY HIGHWAYS

## 28 LBS/SQ.FT.




| PANEL SIZE (Each) | SQ. FT. (Each) | POST INFORMATION URBAN | POST INFORMATION RURAL | MOUNTING HEIGHT URBAN | MOUNTING HEIGHT RURAL | FOUNDATION DEPTH URBAN | FOUNDATION DEPTH RURAL | REMARKS |
|---|---|---|---|---|---|---|---|---|
| REGULATORY SERIES | | | | | | | | |
| 30" x 30" | 5.2 | 2"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 30" x 30" WITH 12" x 6" | 5.2+.5 | 2"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" | 7.5 | 2½"Ø PIPE | 4"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" WITH 12" x6" | 7.5+.5 | 2½"Ø PIPE | 4"Ø POLE | 7'-0" | 5'-0" | 3'-6" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" | 13.3 | 3½"Ø PIPE | 4"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 24" x 30" | 5.0 | 2"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 24" x 30" WITH 13" x13" | 5.0+1.2 | 2½"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 60" | 20.0 | 3½"Ø PIPE | 5"Ø POLE | 7'-0" | 5'-0" | 3'-6" | 3'-0" | MAJOR PANEL ONLY |
| 48" x 60" WITH 24" x18" | 20.0+3.0 | 4"Ø PIPE | 6"Ø POLE | 7'-6" | 5'-6" | 3'-6" | 3'-6" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 24" x 24" | 4.0 | 2"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 24" x 24" WITH 24" x 18" | 4.0+3.0 | 2½"Ø PIPE | 3"Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" | 9.0 | 2½"Ø PIPE | 4"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" WITH 24" x18" | 9.0+3.0 | 3"Ø PIPE | 4"Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 30" x 30" | 6.3 | 2½"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 48" | 12.0 | 3"Ø PIPE | 5"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 24" x 12" | 2.0 | 2"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 24" | 6.0 | 2½"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 30" x 36" | 7.5 | 2½"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 30" x 18" | 3.8 | 2"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 12" | 3.0 | 2"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 18" x 24" | 3.0 | 2"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 12" x 18" | 1.5 | 2"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 12" x 6" | .5 | 2"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" x 36" | 3.9 | 2"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 48" x 48" x 48" | 6.6 | 2½"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| WARNING SERIES | | | | | | | | |
| 30" x 30" | 6.3 | 2½"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 30" x 30" WITH 18" x 18" | 6.3+2.3 | 2½"Ø PIPE | 4"Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 30" x 30" WITH 24" x24" | 6.3+4.0 | 2½"Ø PIPE | 4"Ø POLE | 8'-0" | 6'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 30" x 30" WITH 24" x18" | 6.3+3.0 | 2½"Ø PIPE | 4"Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" | 9.0 | 2½"Ø PIPE | 4"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" WITH 18" x 18" | 9.0+2.3 | 3"Ø PIPE | 4"Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" WITH 24" x24" | 9.0+4.0 | 3"Ø PIPE | 4"Ø POLE | 8'-0" | 6'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" WITH 24" x18" | 9.0+3.0 | 3"Ø PIPE | 4"Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" | 16.0 | 3½"Ø PIPE | 5"Ø POLE | 7'-0" | 5'-0" | 3'-6" | 3'-0" | MAJOR PANEL ONLY |
| 48" x 48" WITH 18" x 18" | 16.0+2.3 | 3½"Ø PIPE | 5"Ø POLE | 7'-6" | 5'-6" | 3'-6" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" WITH 24" x24" | 16.0+4.0 | 3½"Ø PIPE | 5"Ø POLE | 8'-0" | 6'-0" | 3'-6" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" WITH 24" x18" | 16.0+3.0 | 3½"Ø PIPE | 5"Ø POLE | 7'-6" | 5'-6" | 3'-6" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 24" | 8.0 | 2) 2"Ø PIPE | (2) 3"Ø POLE | 7'-0" | 5'-0" | 3'-0 | 3'-0" | MAJOR PANEL ONLY TWO POSTS REQUIRED |
| 48" x 60" | 20.0 | 3½"Ø PIPE | 5"Ø POLE | 7'-0" | 5'-0" | 3'-6" | 3'-0" | MAJOR PANEL ONLY |
| 36" DIA. | 7.0 | 2½"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 48" x 48" | 5.5 | 2½"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| SCHOOL XING SERIES | | | | | | | | |
| 36" x 36" | 6.8 | 2½"Ø PIPE | 3"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" WITH 36" x12" | 6.8+3.0 | 2½"Ø PIPE | 4"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" WITH 36" x18" | 6.8+4.5 | 3"Ø PIPE | 4"Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" | 12.0 | 3"Ø PIPE | 4"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 48" x 48" WITH 36" x12" | 12.0+3.0 | 3"Ø PIPE | 5"Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" WITH 36" x18" | 12.0+4.5 | 3½"Ø PIPE | 5"Ø POLE | 7'-6" | 5'-6" | 3'-6" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
TYPICAL ERECTION
SPECIFICATION STANDARDS
28 LBS/SQ.FT.

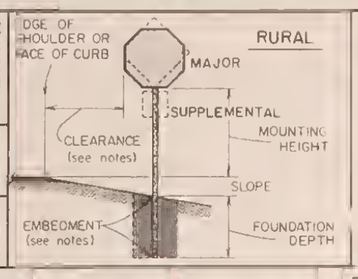
SIGNING
STANDARD DRAWING NO. 211

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: [signature]
ADMINISTRATOR - ENGINEERING DIVISION

NOTES

1. Information contained herein is based on 28Lbs/Sq.Ft. per the Wind Design Specifications for the Department of Highways.
2. Post Information shown above is figured for a Major Panel mounted by itself, and/or a Major Panel mounted with a Supplemental Panel below.
3. The Mounting Heights shown above are figured at :
   a) 5 feet in Rural conditions, measured from the bottom of the Major Panel, when used alone, to the near edge of the pavement;
   b) 7 feet in Urban (and Municipal) conditions, measured from the bottom of the Major Panel, when used alone, to the near top of the ground or pavement; (see sketches above, top)
   c) and 1 foot less than the above, measured from the bottom of the Supplemental Panel, when used below a Major Panel.
4. For Clearance, see Signing Standard Drawing No. 215.
5. For Embedments, see Signing Standard Drawing No. 224 & 228

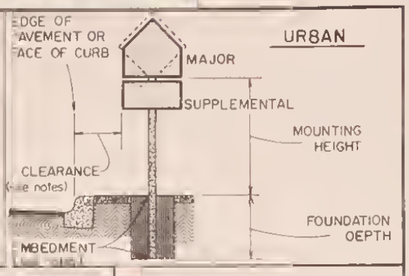
| CHECKED BY: | DRAWN BY: |
|---|---|
| 8-8-73 | 8-1-73 |
| C.H.L. | G.E.G. |




# TYPICAL ERECTION SPECIFICATION STANDARDS

## PRIMARY & SECONDARY HIGHWAYS

## 32 LBS/SQ.FT




| PANEL SIZE (Each) | SQ. FT. (Each) | POST INFORMATION URBAN | POST INFORMATION RURAL | MOUNTING HEIGHT URBAN | MOUNTING HEIGHT RURAL | FOUNDATION DEPTH URBAN | FOUNDATION DEPTH RURAL | REMARKS |
|---|---|---|---|---|---|---|---|---|
| **REGULATORY SERIES** | | | | | | | | |
| 30" x 30" | 5.2 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 30" x 30" WITH 12" x 6" | 5.2+.5 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" | 7.5 | 2½" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" WITH 12" x 6" | 7.5+.5 | 2½" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" | 13.3 | 3" Ø PIPE | 5" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 24" x 30" | 5.0 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 48" x 48" WITH 13" x 13" | 13.3+1.2 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 60" | 20.0 | 4" Ø PIPE | 5" Ø POLE | 7'-0" | 5'-0" | 3'-6" | 3'-0" | MAJOR PANEL ONLY |
| 48" x 60" WITH 24" x 18" | 20.0+3.0 | 4" Ø PIPE | 6" Ø POLE | 7'-6" | 5'-6" | 3'-6" | 3'-6" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 24" x 24" | 4.0 | 2" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 24" x 24" WITH 24" x 18" | 4.0+3.0 | 2½" Ø PIPE | 4" Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" | 9.0 | 2½" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" WITH 24" x 18" | 9.0+3.0 | 3" Ø PIPE | 5" Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 30" x 30" | 6.3 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 48" | 12.0 | 3" Ø PIPE | 5" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 24" x 12" | 2.0 | 2" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 24" | 6.0 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 30" x 36" | 7.5 | 2½" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 30" x 18" | 3.8 | 2" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 12" | 3.0 | 2" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 18" x 24" | 3.0 | 2" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 12" x 18" | 1.5 | 2" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 12" x 6" | .5 | 2" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" x 36" | 3.9 | 2" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 48" x 48" x 48" | 6.6 | 2½" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| **WARNING SERIES** | | | | | | | | |
| 30" x 30" | 6.3 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 30" x 30" WITH 18" x 18" | 6.3+2.3 | 2½" Ø PIPE | 4" Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 30" x 30" WITH 24" x 24" | 6.3+4.0 | 3" Ø PIPE | 4" Ø POLE | 8'-0" | 6'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 30" x 30" WITH 24" x 18" | 6.3+3.0 | 3" Ø PIPE | 4" Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" | 9.0 | 3" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" WITH 18" x 18" | 9.0+2.3 | 3" Ø PIPE | 4" Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" WITH 24" x 24" | 9.0+4.0 | 3" Ø PIPE | 5" Ø POLE | 8'-0" | 6'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" WITH 24" x 18" | 9.0+3.0 | 3" Ø PIPE | 5" Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" | 16.0 | 3½" Ø PIPE | 5" Ø POLE | 7'-0" | 5'-0" | 3'-6" | 3'-0" | MAJOR PANEL ONLY |
| 48" x 48" WITH 18" x 18" | 16.0+2.3 | 3½" Ø PIPE | 5" Ø POLE | 7'-6" | 5'-6" | 3'-6" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" WITH 24" x 24" | 16.0+4.0 | 4" Ø PIPE | 6" Ø POLE | 8'-0" | 6'-0" | 3'-6" | 3'-6" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" WITH 24" x 18" | 16.0+3.0 | 4" Ø PIPE | 5" Ø POLE | 7'-6" | 5'-6" | 3'-6" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 24" | 8.0 | (2) 2" Ø PIPE | (2) 3" Ø POLE | 7'-0" | 5'-0" | 3'-0 | 3'-0" | MAJOR PANEL ONLY TWO POSTS REQUIRED |
| 48" x 60" | 20.0 | 4" Ø PIPE | 6" Ø POLE | 7'-0" | 5'-0" | 3'-6" | 3'-6" | MAJOR PANEL ONLY |
| 36" DIA | 7.0 | 2½" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 48" x 48" | 5.5 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| **SCHOOL XING SERIES** | | | | | | | | |
| 36" x 36" | 6.8 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" WITH 36" x 12" | 6.8+3.0 | 3" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" WITH 36" x 18" | 6.8+4.5 | 3" Ø PIPE | 4" Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" | 12.0 | 3" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 48" x 48" WITH 36" x 12" | 12.0+3.0 | 3½" Ø PIPE | 5" Ø POLE | 7'-0" | 5'-0" | 3'-6" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" WITH 36" x 18" | 12.0+4.5 | 3½" Ø PIPE | 5" Ø POLE | 7'-6" | 5'-6" | 3'-6" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
TYPICAL ERECTION
SPECIFICATION STANDARDS
32 LBS/SQ.FT.

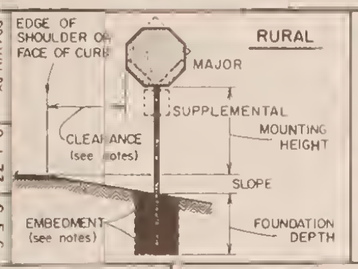
SIGNING
STANDARD DRAWING NO. 212

APPROVED H.J. ANDERSON - DIRECTOR OF HIGHWAYS
BY [signature]
ADMINISTRATOR - ENGINEERING DIVISION

NOTES

1. Information contained herein is based on 32Lbs/Sq.Ft. per the Wind Design Specifications for the Department of Highways.
2. Post Information shown above is figured for a Major Panel mounted by itself, and/or a Major Panel mounted with a Supplemental Panel below.
3. The Mounting Heights shown above are figured at :
   a) 5 feet in Rural conditions, measured from the bottom of the Major Panel, when used alone, to the near edge of the pavement.
   b) 7 feet in Urban (and Municipal) conditions, measured from the bottom of the Major Panel, when used alone, to the near top of the ground or pavement; (see sketches above, top)
   c) and 1 foot less than the above, measured from the bottom of the Supplemental Panel, when used below a Major Panel.
4. For Clearance, see Signing Standard Drawing No. 215.
5. For Embedments, see Signing Standard Drawing No. 224 & 228.

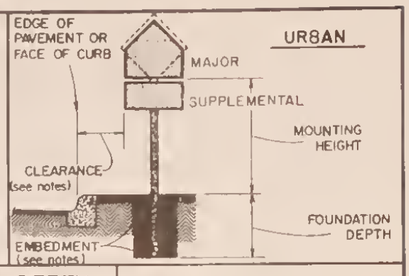
CHECKED BY: C.H.L. | DRAWN BY: G.E.G. | 8-8-73 | 8-1-73




# TYPICAL ERECTION SPECIFICATION STANDARDS

## PRIMARY & SECONDARY HIGHWAYS

## 40 LBS/SQ.FT.




| PANEL SIZE (Each) | SQ. FT. (Each) | POST INFORMATION URBAN | POST INFORMATION RURAL | MOUNTING HEIGHT URBAN | MOUNTING HEIGHT RURAL | FOUNDATION DEPTH URBAN | FOUNDATION DEPTH RURAL | REMARKS |
|---|---|---|---|---|---|---|---|---|
| REGULATORY SERIES | | | | | | | | |
| 30" x 30" | 5.2 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 30" x 30" WITH 12" x 6" | 5.2 + .5 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" | 7.5 | 3" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" WITH 12" x 6" | 7.5 + .5 | 3" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" | 13.3 | 3½" Ø PIPE | 5" Ø POLE | 7'-0" | 5'-0" | 3'-6" | 3'-0" | MAJOR PANEL ONLY |
| 24" x 30" | 5.0 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 24" x 30" WITH 13" x 13" | 5.0 + 1.2 | 2½" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 60" | 20.0 | 4" Ø PIPE | 6" Ø POLE | 7'-0" | 5'-0" | 3'-6" | 3'-6" | MAJOR PANEL ONLY |
| 48" x 60" WITH 24" x 18" | 20.0 + 3.0 | 5" Ø PIPE | 6" Ø POLE | 7'-6" | 5'-6" | 3'-6" | 3'-6" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 24" x 24" | 4.0 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 24" x 24" WITH 24" x 18" | 4.0 + 3.0 | 2½" Ø PIPE | 4" Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" | 9.0 | 3" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" WITH 24" x 18" | 9.0 + 3.0 | 3½" Ø PIPE | 5" Ø POLE | 7'-6" | 5'-6" | 3'-6" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 30" x 30" | 6.3 | 2½" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 48" | 12.0 | 3½" Ø PIPE | 5" Ø POLE | 7'-0" | 5'-0" | 3'-6" | 3'-0" | MAJOR PANEL ONLY |
| 24" x 12" | 2.0 | 2" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 24" | 6.0 | 2½" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 30" x 36" | 7.5 | 3" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 30" x 18" | 3.8 | 2" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 12" | 3.0 | 2" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 18" x 24" | 3.0 | 2" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 12" x 18" | 1.5 | 2" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 12" x 6" | .5 | 2" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" x 36" | 3.9 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 48" x 48" x 48" | 6.6 | 2½" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| WARNING SERIES | | | | | | | | |
| 30" x 30" | 6.3 | 2½" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 30" x 30" WITH 18" x 18" | 6.3 + 2.3 | 3" Ø PIPE | 4" Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 30" x 30" WITH 24" x 24" | 6.3 + 4.0 | 3" Ø PIPE | 5" Ø POLE | 8'-0" | 6'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 30" x 30" WITH 24" x 18" | 6.3 + 3.0 | 3" Ø PIPE | 4" Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" | 9.0 | 3" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" WITH 18" x 18" | 9.0 + 2.3 | 3" Ø PIPE | 5" Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" WITH 24" x 24" | 9.0 + 4.0 | 3½" Ø PIPE | 5" Ø POLE | 8'-0" | 6'-0" | 3'-6" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" WITH 24" x 18" | 9.0 + 3.0 | 3½" Ø PIPE | 5" Ø POLE | 7'-6" | 5'-6" | 3'-6" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" | 16.0 | 4" Ø PIPE | 6" Ø POLE | 7'-0" | 5'-0" | 3'-6" | 3'-6" | MAJOR PANEL ONLY |
| 48" x 48" WITH 18" x 18" | 16.0 + 2.3 | 4" Ø PIPE | 6" Ø POLE | 7'-6" | 5'-6" | 3'-6" | 3'-6" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" WITH 24" x 24" | 16.0 + 4.0 | 4" Ø PIPE | 6" Ø POLE | 8'-0" | 6'-0" | 3'-6" | 3'-6" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" WITH 24" x 18" | 16.0 + 3.0 | 4" Ø PIPE | 6" Ø POLE | 7'-6" | 5'-6" | 3'-6" | 3'-6" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 24" | 8.0 | 2) 2½" Ø PIPE | (2) 3" Ø POLE | 7'-0" | 5'-0" | 3'-0 | 3'-0" | MAJOR PANEL ONLY TWO POSTS REQUIRED |
| 48" x 60" | 20.0 | 4" Ø PIPE | 6" Ø POLE | 7'-0" | 5'-0" | 3'-6" | 3'-6" | MAJOR PANEL ONLY |
| 36" DIA | 7.0 | 2½" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 48" x 48" | 5.5 | 2½" Ø PIPE | 3" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| SCHOOL XING SERIES | | | | | | | | |
| 36" x 36" | 6.8 | 3" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 36" x 36" WITH 36" x 12" | 6.8 + 3.0 | 3" Ø PIPE | 4" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 36" x 36" WITH 36" x 18" | 6.8 + 4.5 | 3" Ø PIPE | 5" Ø POLE | 7'-6" | 5'-6" | 3'-0" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" | 12.0 | 3½" Ø PIPE | 5" Ø POLE | 7'-0" | 5'-0" | 3'-0" | 3'-0" | MAJOR PANEL ONLY |
| 48" x 48" WITH 36" x 12" | 12.0 + 3.0 | 3½" Ø PIPE | 5" Ø POLE | 7'-0" | 5'-0" | 3'-6" | 3'-0" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |
| 48" x 48" WITH 36" x 18" | 12.0 + 4.5 | 4" Ø PIPE | 6" Ø POLE | 7'-6" | 5'-6" | 3'-6" | 3'-6" | MAJOR PANEL WITH SUPPLEMENTAL PANEL |

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
TYPICAL ERECTION
SPECIFICATION STANDARDS
40 LBS/SQ.FT.

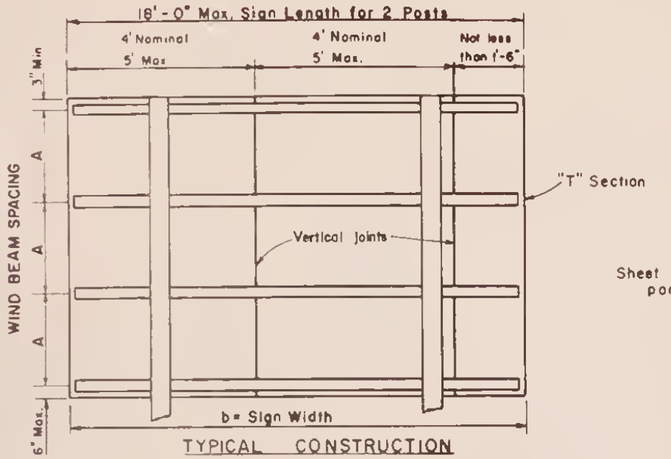
SIGNING
STANDARD DRAWING NO. 213

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: [signature]
ADMINISTRATOR - ENGINEERING DIVISION

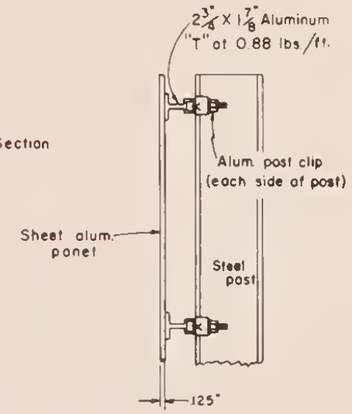
NOTES

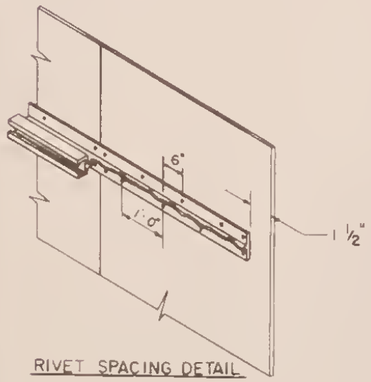
1. Information contained herein is based on 40 Lbs/Sq Ft. per the Wind Design Specifications for the Department of Highways.
2. Post Information shown above is figured for a Major Panel mounted by itself, and/or a Major Panel mounted with a Supplemental Panel below.
3. The Mounting Heights shown above are figured at:
   a) 5 feet in Rural conditions, measured from the bottom of the Major Panel, when used alone, to the near edge of the pavement;
   b) 7 feet in Urban (and Municipal) conditions, measured from the bottom of the Major Panel, when used alone, to the near top of the ground or pavement; (see sketches above, top)
   c) and 1 foot less than the above, measured from the bottom of the Supplemental Panel, when used below a Major Panel.
4. For Clearance, see Signing Standard Drawing No. 215.
5. For Embedments, see Signing Standard Drawing No. 224 & 228.

## ALUMINUM SHEET INCREMENT GUIDE SIGN




TYPICAL CONSTRUCTION



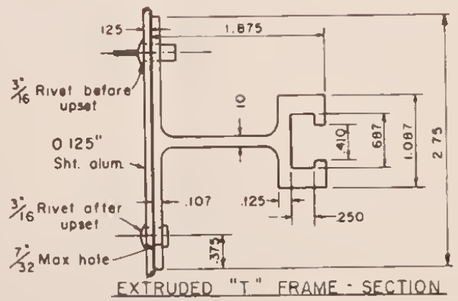




RIVET SPACING DETAIL

NOTE:

Rivets 6" apart staggered from one side to another on horizontal extruded T-Section.

Rivets doubled (both sides of extruded T-Section) at horizontal and vertical joints in sheet aluminum face and at ends of extruded T-section.




EXTRUDED "T" FRAME - SECTION

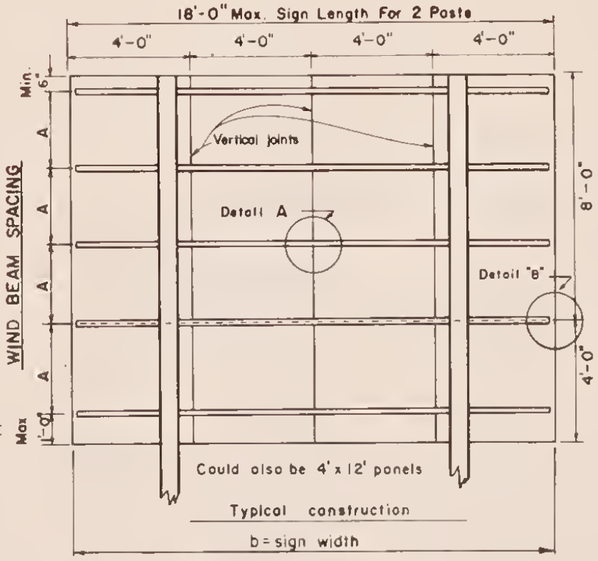
NOTES ALUMINUM SIGNS

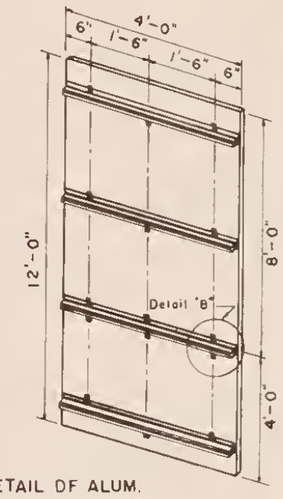
1. ALL ALUMINUM SIGNS SHALL CONFORM TO SECTION 88, ART. M-320.01 (B) & M-320.02 (A) OF THE STANDARD SPECIFICATIONS.
2. SIGNS LESS THAN 4'-0" HIGH AND 6'-0" LONG SHALL BE MADE OF A SINGLE SHEET OF ALUMINUM.
3. SIGNS UP TO, AND INCLUDING, 6'-0" HIGH SHALL HAVE NO HORIZONTAL JOINTS, AND NO SHEET SHALL BE LESS THAN 1'-6" WIDE.
4. SIGNS OVER 6'-0" HIGH MAY HAVE HORIZONTAL AND VERTICAL JOINTS, HOWEVER, NO SHEET SHALL BE LESS THAN 1'-6" WIDE OR 1'-6" HIGH.
5. TIGHTEN POST CLIP NUTS TO 225 IN/LB TORQUE USING DRY, CLEAN THREADS.

PLYWOOD SIGNS

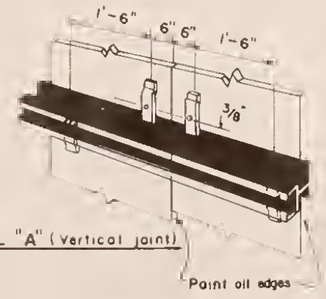
1. ALL PLYWOOD SIGNS SHALL CONFORM TO SECTION 88, ART. M-320.01 (C) & M-320.02 (B) OF THE STANDARD SPECIFICATIONS.
2. SIGNS 4'-0" HIGH OR GREATER SHALL HAVE NO PANEL LESS THAN 4'-0" IN HEIGHT.
3. SIGNS UNDER 4'-0" HIGH SHALL NOT HAVE HORIZONTAL JOINTS.
4. SIGNS WITH WIDTHS THAT ARE NOT IN MULTIPLES OF 4'-0" SHALL HAVE ODD PANEL ON INSIDE EDGE.
5. FOR SIGNS OVER 10'-0" IN HEIGHT, THE FULL HEIGHT MAY BE OBTAINED WITH PANELS HAVING A FACTORY SCARFED JOINT IN LIEU OF USING STANDARD LENGTH PANEL AS SHOWN.
6. NO INDIVIDUAL PANEL SHALL BE SMALLER THAN 1'-6" WIDE BY 4'-0" HIGH.

## PLYWOOD SHEET INCREMENT GUIDE SIGN

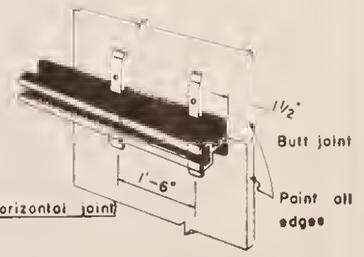



DETAIL OF ALUM. CLIP PLACEMENT




DETAIL "A" (Vertical joint)




DETAIL "B" (Horizontal joint)

NOTES GENERAL

ALL HORIZONTAL JOINTS SHALL OCCUR AT A "T" SECTION.

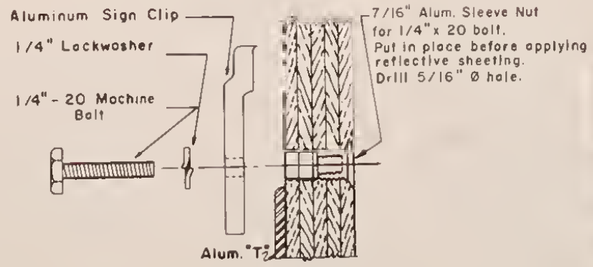
NO SPLICES ARE ALLOWED IN EXTRUDED "T" SECTIONS.

ALL SCREWS, BOLTS, AND LOCKWASHERS SHALL BE OF ALUMINUM ALLOY, STAINLESS STEEL, OR CADMIUM PLATED STEEL.

ONLY ALUMINUM RIVETS SHALL BE USED.

| WIND BEAM CHART (PLYWOOD) | | |
|---|---|---|
| WIND BEAM SPACING "A" | MAXIMUM WIDTH (b) | |
| | 2 POST | 3 POST |
| 1'-8" | 18'-0" | 27'-0" |
| 1'-10" | 17'-0" | 25'-8" |
| 2'-0" | 16'-6" | 24'-8" |
| 2'-6" | 14'-9" | 22'-0" |
| 3'-0" | 13'-6" | 20'-0" |
| 3'-6" | 12'-6" | 18'-6" |

| WIND BEAM CHART (ALUMINUM) | | |
|---|---|---|
| WIND BEAM SPACING "A" | MAXIMUM WIDTH (b) | |
| | 2 POST | 3 POST |
| 1'-8" | 18'-0" | 27'-0" |
| 1'-10" | 17'-0" | 25'-8" |
| 2'-0" | 16'-6" | 24'-8" |


Aluminum Sign Clip
1/4" Lockwasher
1/4" - 20 Machine Bolt
7/16" Alum. Sleeve Nut for 1/4" x 20 bolt. Put in place before applying reflective sheeting. Drill 5/16" Ø hole.
Alum. "T"

DETAIL OF CLIP

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS

BY: _____
ADMINISTRATOR - ENGINEERING DIVISION

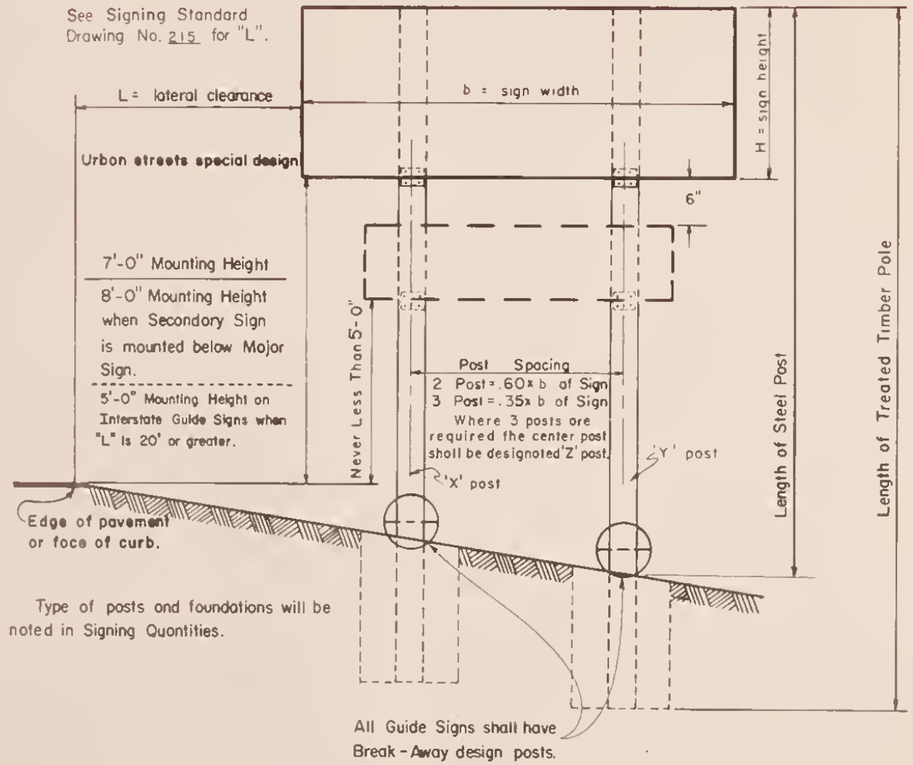
SIGNING
STANDARD DRAWING NO. 219

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
GENERAL GUIDE SIGN
CONSTRUCTION DETAILS

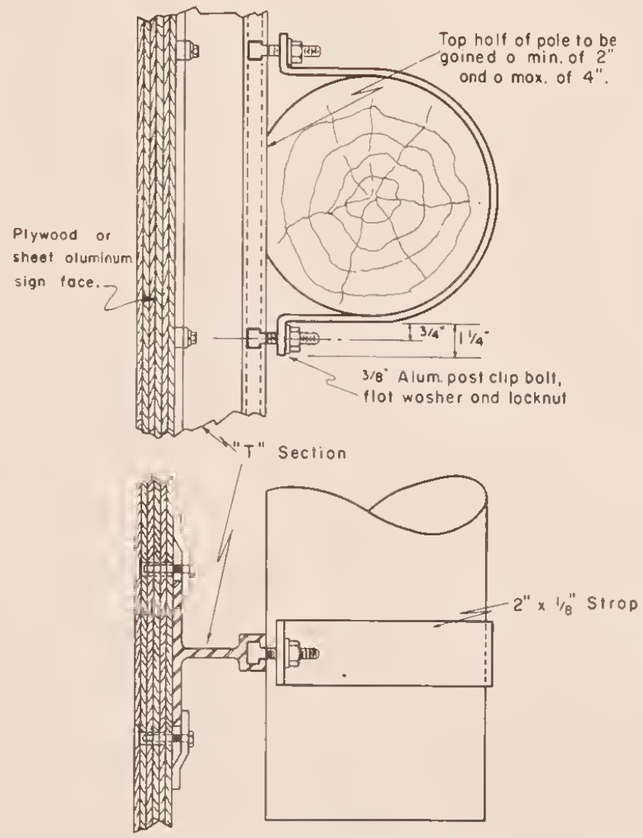
| | | | |
|---|---|---|---|
| DRAWN BY: | 3-30-73 | G. E. G. | |
| CHECKED BY: | 3-30-73 | GAJ | |

| | | | |
|---|---|---|---|
| REVISED | 10/9/74 | | |
| EFFECTIVE | 2/1/75 | | |

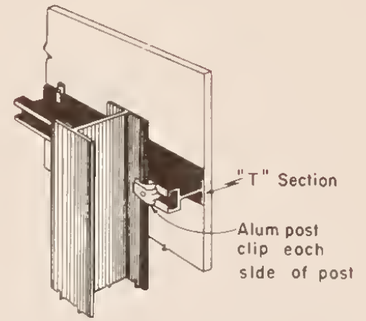
## GUIDE SIGN PLACEMENT


See Signing Standard Drawing No. 215 for "L".
L = lateral clearance
b = sign width
H = sign height
Urbon streets special design
6"
7'-0" Mounting Height
8'-0" Mounting Height when Secondary Sign is mounted below Major Sign.
5'-0" Mounting Height on Interstate Guide Signs when "L" is 20' or greater.
Never Less Than 5'-0"
Post Spacing
2 Post = .60 x b of Sign
3 Post = .35 x b of Sign
Where 3 posts are required the center post shall be designated 'Z' post.
'X' post
'Y' post
Length of Steel Post
Length of Treated Timber Pole
Edge of pavement or face of curb.
Type of posts and foundations will be noted in Signing Quantities.
All Guide Signs shall have Break - Away design posts.

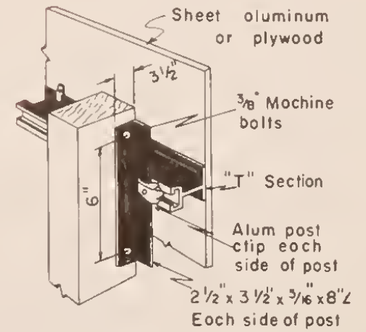
## GUIDE SIGN MOUNTING DETAILS


Top half of pole to be goined o min. of 2" and o max. of 4".
Plywood or sheet oluminum sign face.
3/4"
1 1/4"
3/8" Alum. post clip bolt, flat washer and locknut
"T" Section
2" x 1/8" Strop

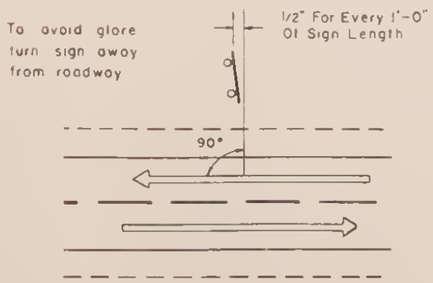
TREATED TIMBER POLE

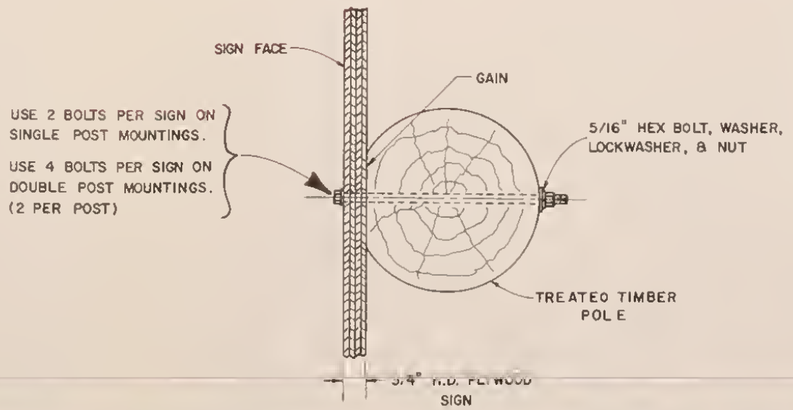



STEEL POST


Sheet oluminum or plywood
3 1/2"
3/8" Machine bolts
"T" Section
6"
Alum post clip each side of post
2 1/2" x 3 1/2" x 3/16" x 8" L
Each side of post

TREATED TIMBER POST





SIGN FACE
GAIN
USE 2 BOLTS PER SIGN ON SINGLE POST MOUNTINGS.
USE 4 BOLTS PER SIGN ON DOUBLE POST MOUNTINGS. (2 PER POST)
5/16" HEX BOLT, WASHER, LOCKWASHER, & NUT
TREATED TIMBER POLE
3/4" H.D. PLYWOOD SIGN

TREATED TIMBER POLE

NOTE:

1. Mounting systems shown are typical Other systems may be approved by the engineer.
2. All steel hardware shall be galvanized.

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS

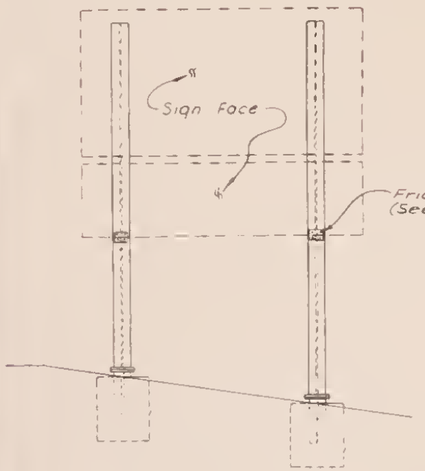
BY: _____
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 220

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
GUIDE SIGN MOUNTING AND PLACEMENT DETAILS

| | | |
|---|---|---|
| DRAWN BY: | 3-30-73 | G. E. G. |
| CHECKED BY: | 3-30-73 | GAJ |

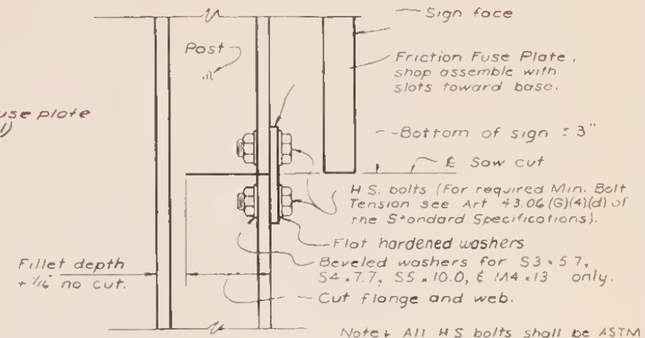
| | | | |
|---|---|---|---|
| REVISED | 10/9/74 | | |
| EFFECTIVE | 2/1/75 | | |




TYPICAL SIGN ELEVATION

## PROCEDURE FOR BASE CONNECTION ASSEMBLY

1. Assemble post to stub with bolts and one flat washer between plates.
2. Shim as required to plumb post.
3. Tighten bolts in a systematic order to the prescribed torque. (See Table).
4. Loosen each bolt and retighten to prescribed torque in the same order as original tightening DO NOT OVERTIGHTEN.
5. Burr threads at junction with nut using a center punch to prevent nut loosening.


Sign face
Post
Friction Fuse Plate, shop assemble with slots toward base.
Bottom of sign = 3"
℄ Saw cut
H.S. bolts (For required Min. Bolt Tension see Art 443.06(G)(4)(d) of the Standard Specifications).
Flat hardened washers
Beveled washers for S3 x 5.7, S4 x 7.7, S5 x 10.0, & M4 x 13 only.
Cut flange and web.
Fillet depth ± 1/16" no cut.

Note: All H.S. bolts shall be ASTM A-325 or F-429 Group B

FRICTION FUSE PLATE DETAIL

### BASE CONNECTION DATA

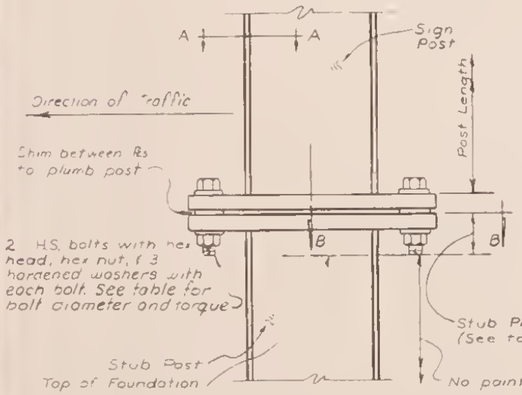
| POST SIZE | BOLT SIZE & TORQUE | DIMENSIONS A | B | C | D | E | $t_1$ | $t_2$ | W | R | WEIGHT OF EACH BREAK-AWAY DEVICE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| W4 x 13 M4 x 13 | 5/8"Φ x 2 3/4 Torque = 480 in. lbs. | 8 1/2 | 5 | 3/8 | 2 3/4 | 1 1/8 | 3/4 | | 5/16 | 11/32 | 21.58 lbs |
| W8 x 17 | | 12 1/2 | 6 1/4 | 3/8 | 4 | 1 1/8 | 3/4 | | 5/16 | 11/32 | 37.00 |
| W8 x 24 | 3/4"Φ x 3 1/2 Torque = 780 in. lbs. | 13 | 7 1/2 | 3/8 | 5 | 1 1/4 | 1 | | 5/16 | 13/32 | 60.86 |
| W12 x 27 | | 17 | 7 1/2 | 7/8 | 5 | 1 1/4 | 1 | | 5/16 | 13/32 | 78.54 |
| S3 x 5.7 | 1/2"Φ x 2 1/2 Torque = 240 in. lbs. | 8 | 3 | 3/4 | 1 1/2 | 3/4 | 5/8 | | 1/4 | 9/32 | 10.37 |
| S4 x 7.7 | | 8 | 3 | 3/4 | 1 1/2 | 3/4 | 5/8 | | 1/4 | 9/32 | 10.45 |
| S5 x 10.0 | 5/8"Φ x 2 3/4 Torque = 480 in. lbs. | 9 1/2 | 4 | 3/4 | 2 | 1 | 3/4 | | 1/4 | 11/32 | 19.08 |

### FUSE PLATE DATA

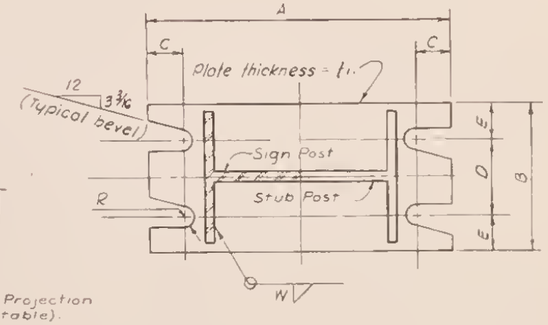
| DIMENSIONS F | G | H | J | K | L | N | $d_1$ | $t_2$ | BOLT DIA. | WEIGHT OF EACH FUSE DEVICE |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 3/4 | 2 | 1 3/8 | 4 | 2 1/4 | 7/8 | 5/8 | 11/16 | 3/8 | 5/8 | 1.60 lbs |
| 4 1/2 | 2 1/2 | 1 1/4 | 5 1/4 | 2 3/8 | 1 1/4 | 3/4 | 13/16 | 1/2 | 3/4 | 3.27 |
| 4 3/8 | 2 1/2 | 1 1/2 | 6 | 3 1/2 | 1 1/4 | 1/8 | 13/16 | 9/16 | 3/4 | 4.66 |
| 5 3/8 | 3 | 1 1/2 | 6 1/2 | 3 1/2 | 1 1/2 | 1/8 | 15/16 | 9/16 | 1/8 | 5.42 |
| 3 1/8 | 1 1/2 | 1 1/8 | 2 5/8 | 1 1/2 | 9/16 | 1/2 | 9/16 | 1/4 | 1/2 | .64 |
| 3 1/8 | 1 1/2 | 1 1/8 | 2 5/8 | 1 1/2 | 9/16 | 1/2 | 9/16 | 1/4 | 1/2 | .64 |
| 3 1/8 | 1 1/2 | 1 1/8 | 3 | 1 7/8 | 9/16 | 1/2 | 9/16 | 1/4 | 1/2 | .66 |

### FOUNDATION DATA

| FTG. DEPTH | STUB LENGTH | STUB PROJ | FTG. DIA | BAR C SIZE | WEIGHT OF EACH STUB POST |
|---|---|---|---|---|---|
| 3-0 | 2-0 | 3 | 1-6 | 5 | 26.00 lbs |
| 4-0 | 2-6 | 3 | 1-9 | 7 | 42.50 |
| 5-0 | 3-0 | 2 1/2 | 2-0 | 9 | 72.00 |
| 6-0 | 3-0 | 2 1/2 | 2-0 | 9 | 81.00 |
| 3-0 | 1-6 | 3 | 1-6 | 4 | 8.55 |
| 3-0 | 1-6 | 3 1/2 | 1-6 | 4 | 11.55 |
| 3-0 | 1-6 | 3 1/2 | 1-6 | 5 | 15.00 |




ELEVATION



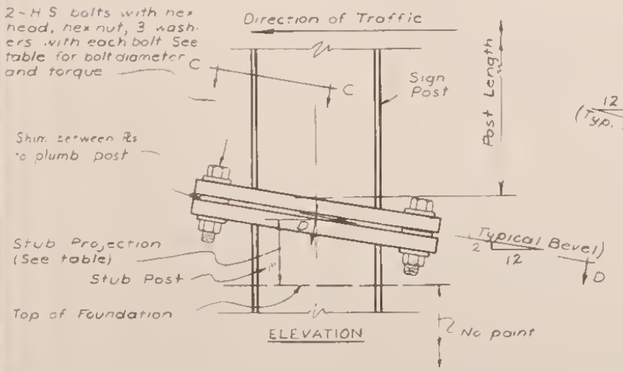

SECTION A-A

SECTION B-B

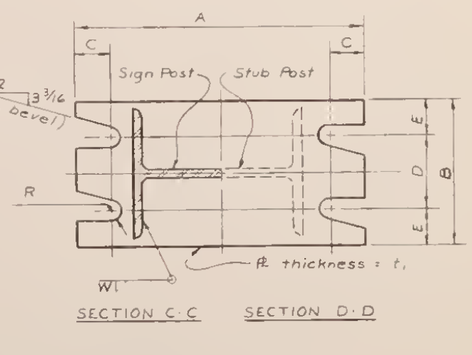
## ⑤ SIGN POST AND STUB POST DETAIL "A"

Note: For type of Breakaway Device See Sign Location & Specifications.

Note: Sections shown are for installations on right shoulder and in gore. Plate slot bevels are opposite hand from that shown for installations on left shoulder.




ELEVATION

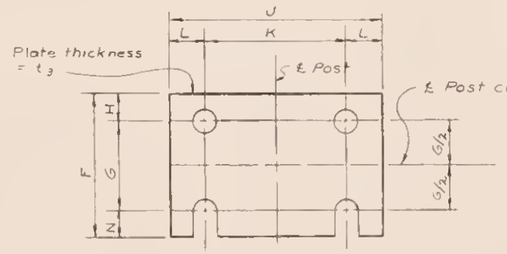



SECTION C-C

SECTION D-D

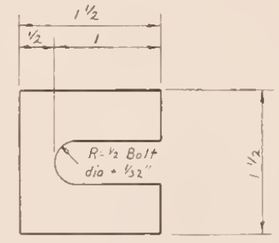
## SIGN POST AND STUB POST DETAIL "B"

NOTE: Friction fuse plates are not required with this detail.




Hole diameter = $d_1$

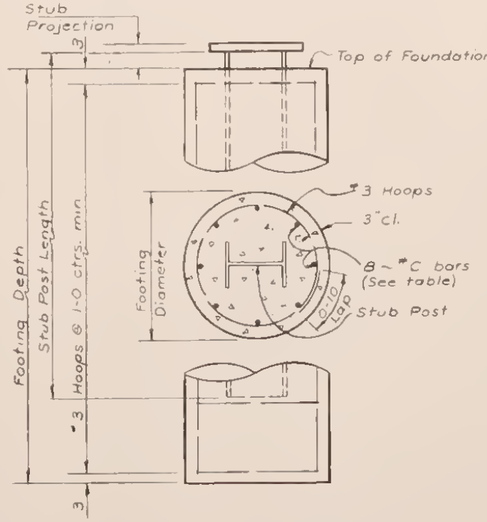
FRICTION FUSE PLATE DETAIL




Furnish 2 - .012" thick and 2 - .032" thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM-B36.

SHIM DETAIL

PAINT - Except as otherwise approved by the Engineer, Structural Steel shall receive one (1) shop coat and one (1) field coat of red lead or basic lead-silico chromate and one (1) field coat of aluminum paint as specified in the Standard Specifications, on all surfaces not in contact with the concrete.




FOUNDATION DETAIL

## NOTES

SPECIFICATIONS - Montana State Highway Commission Standard Specifications for Road and Bridge Construction and any amendments thereto, and Special Provisions shall govern unless otherwise noted. Design of posts and footings prepared in accordance with AASHO Specifications for the Design and Construction of Structural Supports for Highway Signs, 1968 Edition.

CONCRETE - Concrete shall be Class A or D with a wood float finish on top. Form top 12 inches of foundation.

STRUCTURAL STEEL - For requirements governing structural steels and their fabrications, see Section 43 of the Standard Specifications. To avoid oversight, these requirements shall be clearly noted on the shop drawings.

APPROVAL - Shop plans shall be approved by the State of Montana Department of Highways before fabrication is begun.

PAYMENT - The unit price bid per pound for steel posts shall be full payment for the steel posts and footings complete in place including all concrete, reinforcing steel, welding, excavation, paint & all incidentals pertaining thereto. The weight of steel posts shall be computed by taking the length of the post times the nominal weight per foot plus the weight of the break-away device, fuse device, and stub post as shown in the table.

GUIDE SIGNS - For Guide Sign placement and details, see Signing Standard Drawing No 215.

| | | | |
|---|---|---|---|
| DRAWN BY | 12-30-66 | N. H. R. | |
| CHECKED BY. | 1-3-67 | W H L. | |

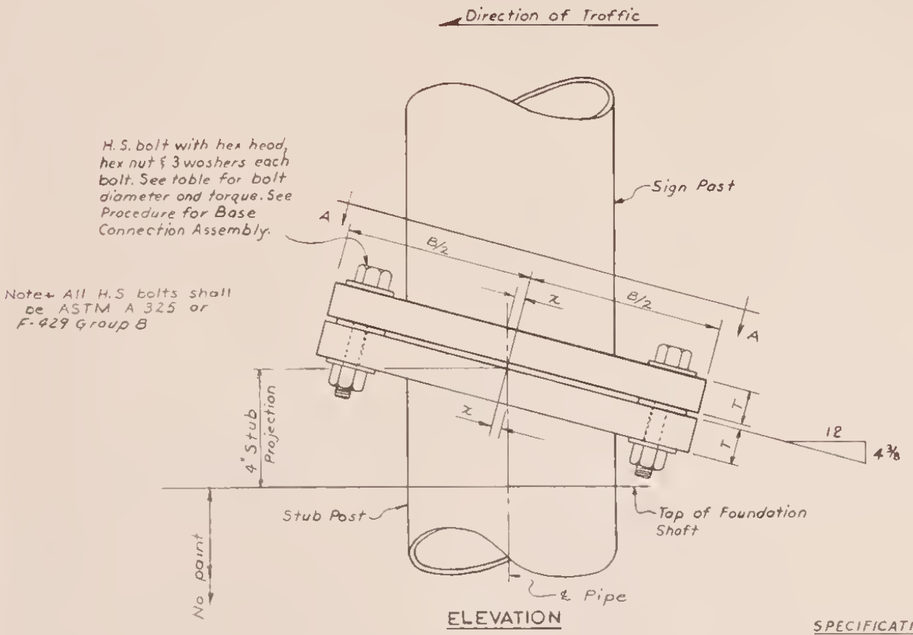
| | | | |
|---|---|---|---|
| REVISED | 10/9/70 | | |
| EFFECTIVE | 2/1/75 | | |

APPROVED: Howard Stratton
SUPERVISOR - BRIDGE SECT.

APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY Jack D. Bechel
ADMINISTRATOR - ENGINEERING DIVISION

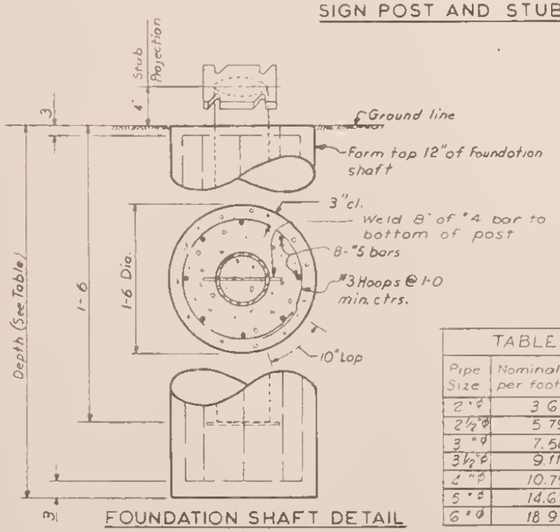
SIGNING
STANDARD DRAWING NO. 223

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
BREAK-AWAY & FOUNOATION DETAILS
FOR MULTIPLE GUIDE SIGN SUPPORTS
BRIDGE DRAWING NO SN-2




ELEVATION

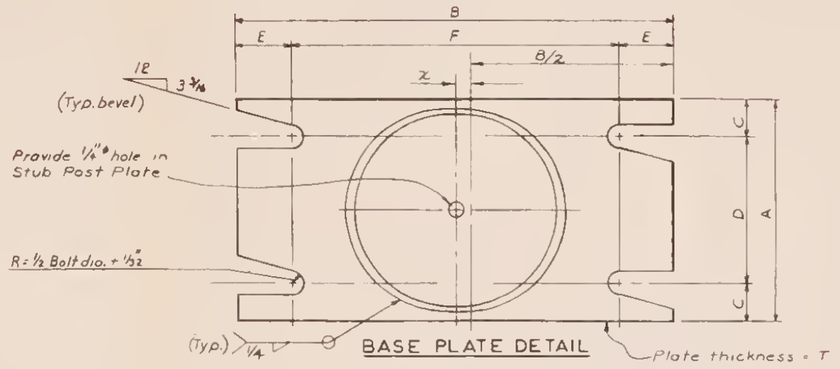
SIGN POST AND STUB POST DETAILS




FOUNDATION SHAFT DETAIL

| TABLE OF WEIGHTS | | |
|---|---|---|
| Pipe Size | Nominal weight per foot of pipe | Weight of each break-away device and stub post |
| 2" ø | 3.65 | |
| 2 1/2" ø | 5.79 | |
| 3" ø | 7.58 | 28.03 |
| 3 1/2" ø | 9.11 | 35.85 |
| 4" ø | 10.79 | 38.44 |
| 5" ø | 14.62 | 61.51 |
| 6" ø | 18.97 | 81.54 |

| BASE CONNECTION DATA | | | | | | | | | | FOUNDATION | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nominal Pipe Size | Bolt Size & Torque | A | B | C | D | E | F | T | X | Footing Diameter | Footing Depth |
| 3" ø | 1/2" ø x 2 1/2" Torque = 240 in lbs. | 4 1/2" | 7 1/2" | 1" | 2 1/4" | 3/4" | 6" | 3/4" | 5/16 | 1-6 | 3-0 |
| 3 1/2" & 4" ø | | 5 1/2" | 8 1/2" | 1" | 3 1/2" | 3/4" | 7" | 3/4" | 5/16 | 1-6 | 3-6 |
| 5" ø | 5/8" ø x 3 1/2 Torque = 480 in lbs. | 6 1/2" | 9 3/4" | 1 1/4" | 4" | 7/8" | 8" | 1" | 3/8 | 1-6 | 3-6 |
| 6" ø | 3/4" ø x 3 1/2 Torque = 780 in lbs. | 7 1/2 | 11 1/4 | 1 1/4 | 5 | 1" | 9 1/4 | 1" | 3/8 | 1-6 | 3-6 |




BASE PLATE DETAIL

SECTION A-A

(See table for Dimensions)

Sections shown are for installation on right shoulder and in gore. Plate slot bevels are opposite hand from that shown for installations on left shoulder.

## PROCEDURE FOR BASE CONNECTION ASSEMBLY

1 Assemble post to stub with bolts and one flat washer between plates

2 Shim as required to plumb post.

3 Tighten bolts in a systematic order to the prescribed torque. (See Table).

4 Loosen each bolt and retighten to prescribed torque in the same order as original tightening. DO NOT OVERTIGHTEN

5 Burr threads at junction with nut using a center punch to prevent nut loosening.

## NOTES

SPECIFICATIONS: Montana State Highway Commission Standard Specifications for Road and Bridge Construction, and any amendments thereto, and Special Provisions shall govern unless otherwise noted. Design of posts and footings prepared in accordance with the A A S H O Specifications for the Design and Construction of Structural Supports for Highway Signs, 1968 Edition.

STEEL PIPE: Steel pipe shall conform to the requirements of A.S.T.M. A-53, Type E or S, Grade B.

CONCRETE: Concrete shall be class A or O with wood float finish on top. Form top 12" inches of foundation.

STRUCTURAL STEEL: For requirements governing structural steels and their fabrication, see Section 43 of the Standard Specifications. To avoid oversight, these requirements shall be clearly noted on the shop drawings.

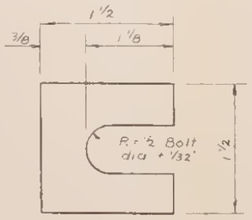
APPROVAL: Shop plans shall be approved by the State of Montana, Department of Highways before fabrication is begun.

PAYMENT: The unit price bid per pound for steel posts shall be full payment for the steel posts and footings complete in place, including all concrete, reinforcing steel, welding, excavation, and all incidentals pertaining thereto. The weight of steel posts shall be computed by taking the length of post times the nominal weight per foot plus the weight of the break-away devices and stub shown in the table plus the weight of post clips and mounting angles.

SIGNS: For Sign placement and details see Signing Standard Drawings.

GALVANIZED PIPE: Shall be galvanized as per ASTM A-123.

PAINT: Except as otherwise approved by the Engineer, Structural Steel shall receive one (1) shop coat and one (1) field coat of red lead or basic lead-silico chromate and one (1) field coat of aluminum paint as specified in the Standard Specifications, on all surfaces not in contact with the concrete

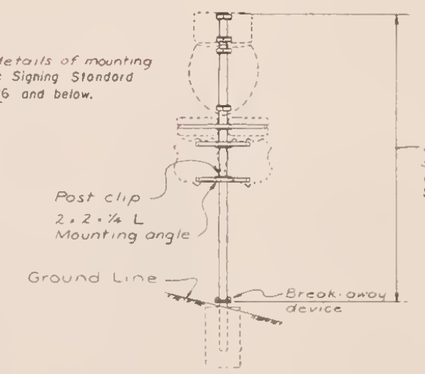



SHIM DETAIL

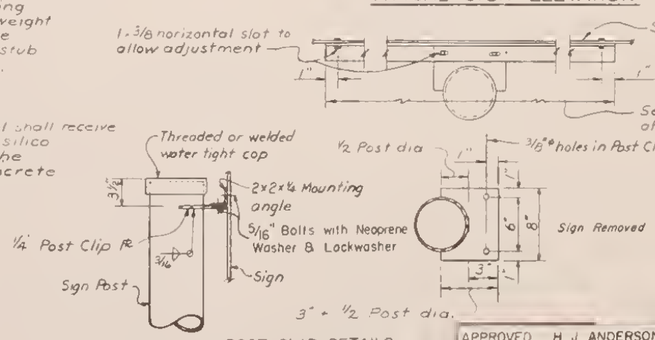
Furnish 2 - .012" thick and 2 - .032" thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36

Note: EMBEDMENTS
2" ø and 2-1/2" ø posts shall have full 3'-0" footing depth embedment.
3" ø and larger posts shall have a 1'-6" embedment.

Note: For details of mounting angles see Signing Standard Drawing No. 226 and below.


Length of posts shown in SIGN LOCATION AND SPECIFICATIONS.
Post clip 2 x 2 x 1/4 L Mounting angle
Ground Line
Break-away device

TYPICAL SIGN ELEVATION




POST CLIP DETAILS

APPROVED H J ANDERSON - DIRECTOR OF HIGHWAYS

BY _____

ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 224

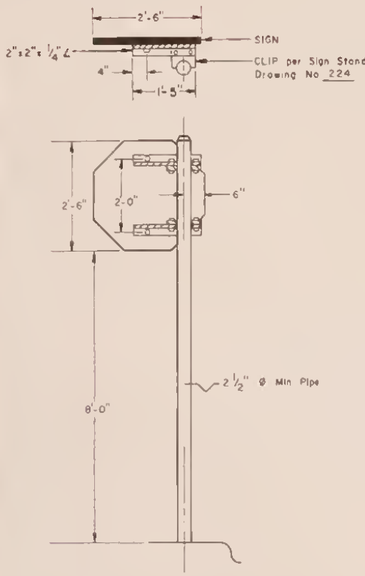
STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
BREAK-AWAY & FOUNDATION DETAILS
FOR SINGLE PIPE SIGN POST

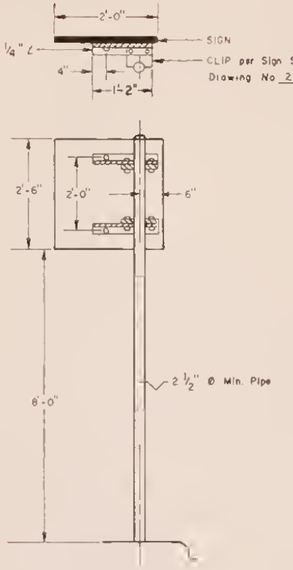
BRIDGE DRAWING NO SN-1

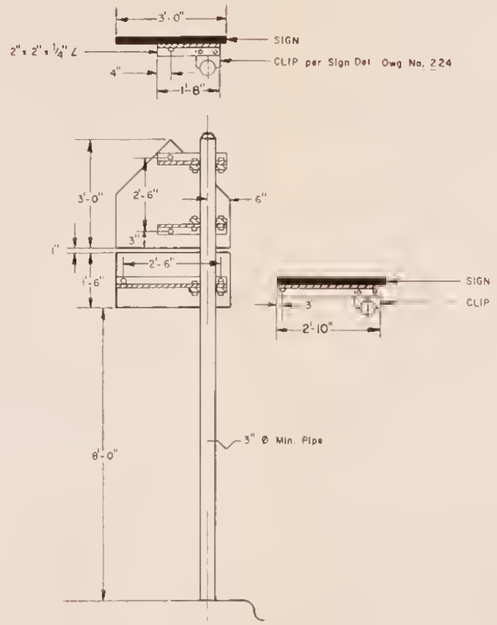
| | | | |
|---|---|---|---|
| DRAWN BY | 12-30-66 | K. E. M. | |
| CHECKED BY: | 1-3-67 | W. H. L | |

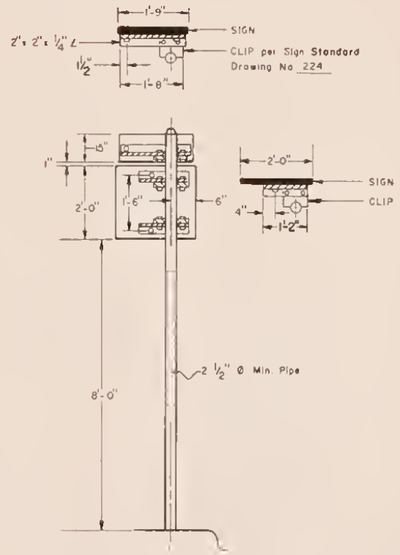
| | | | |
|---|---|---|---|
| REVISED | 10/9/74 | | |
| EFFECTIVE | 2/1/75 | | |

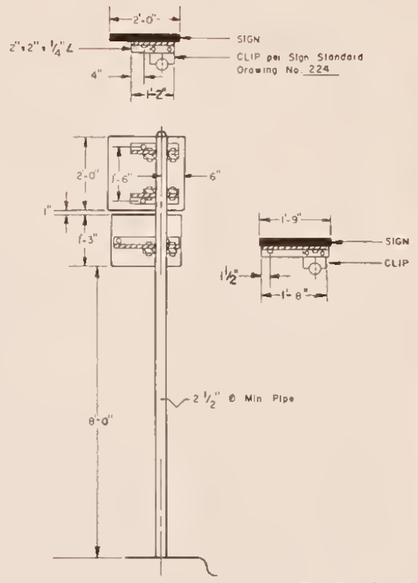
APPROVED _____
SUPERVISOR - BRIDGE SECT

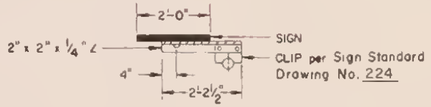


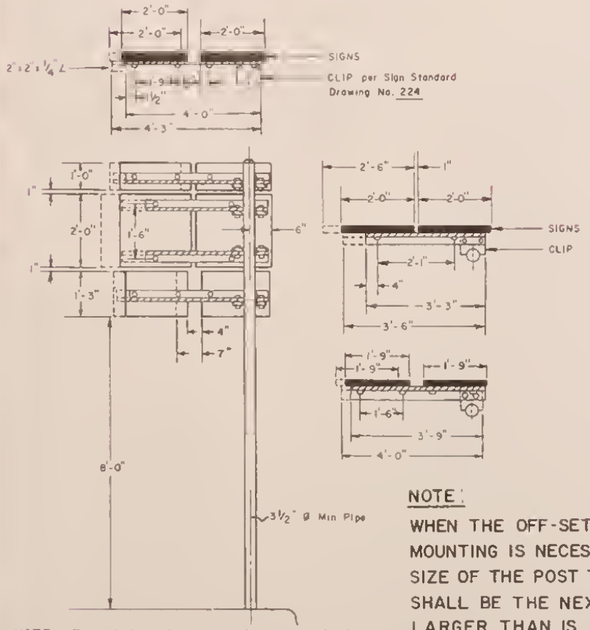



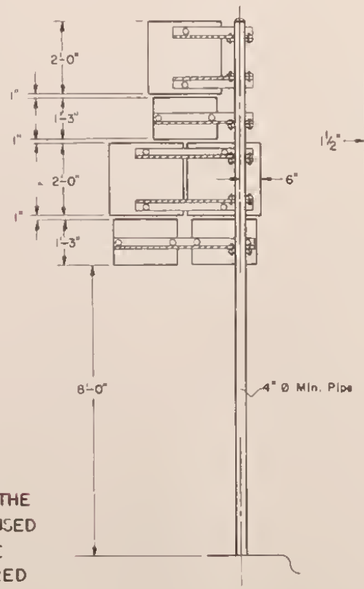



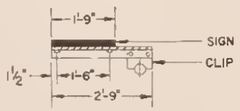



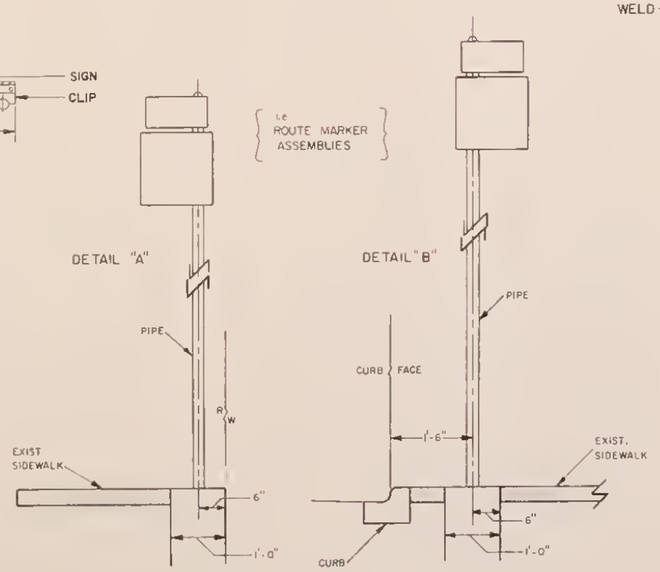




NOTE: Typical back bracing to be used with the larger 24"x30" three digit route markers. The larger route marker & back bracing is shown with a broken line.

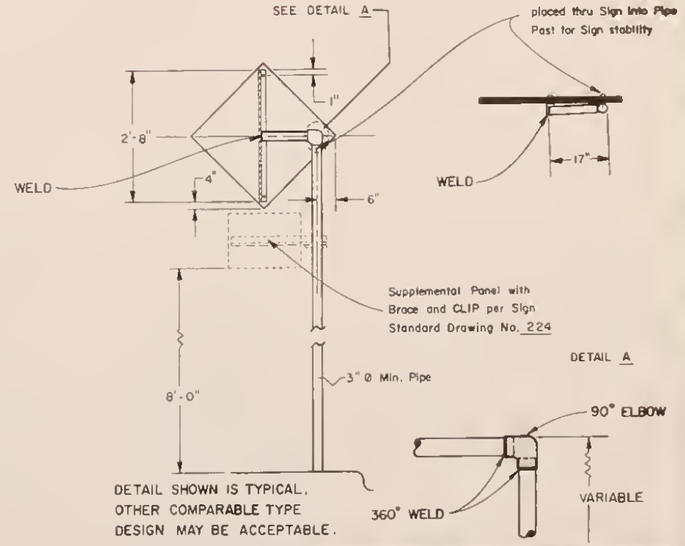



NOTE: WHEN THE OFF-SET TYPE MOUNTING IS NECESSARY, THE SIZE OF THE POST TO BE USED SHALL BE THE NEXT SIZE LARGER THAN IS REQUIRED FOR A STANDARD TYPE MOUNTING.




NOTE: The standard type mounting should be used behind sidewalks if R/W limits permit. If R/W doesn't permit than detail "A" above should be used behind sidewalks or in the sidewalk next to bldg it conditions are such that the sign cannot be mounted on the backside of the sidewalk than detail "B" above should be used




DETAIL SHOWN IS TYPICAL. OTHER COMPARABLE TYPE DESIGN MAY BE ACCEPTABLE.

| | | |
|---|---|---|
| DRAWN BY: | 3-30-73 | G. E. G. |
| CHECKED BY: | 3-30-73 | GAJ |

REV: 8-30-73

| | | | |
|---|---|---|---|
| REVISED | 10/11/74 | | |
| EFFECTIVE | 2/1/75 | | |

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS

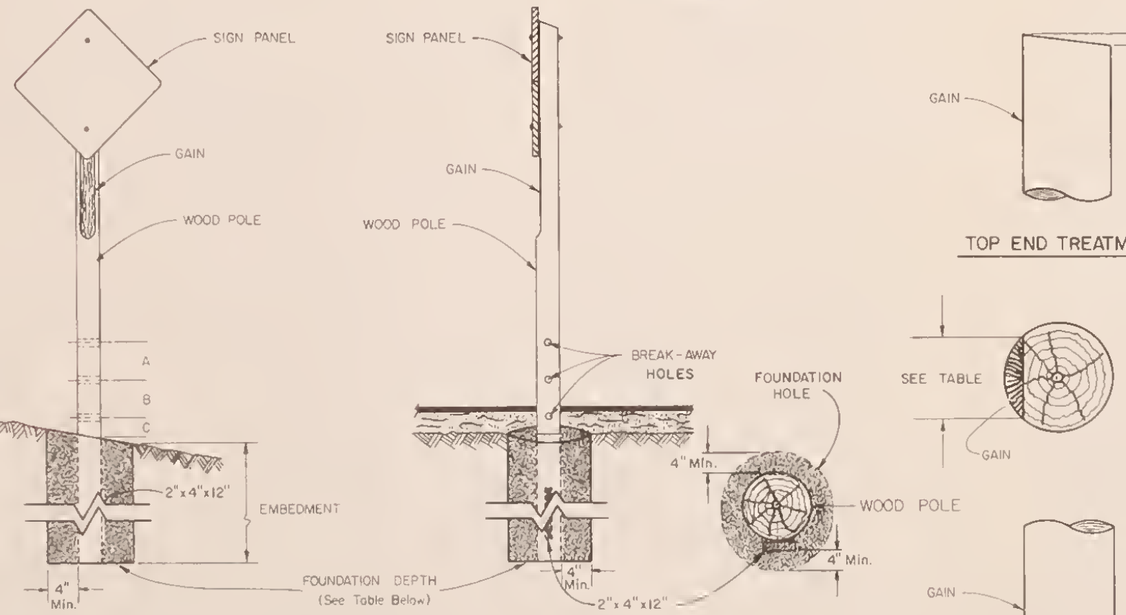
BY: Jack R. Rowbock
ADMINISTRATOR - ENGINEERING DIVISION

# SIGNING STANDARD DRAWING NO. 227

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
OFF-SET TYPE SIGN SUPPORT DETAILS
FOR SIDEWALK AREAS

NOTES:

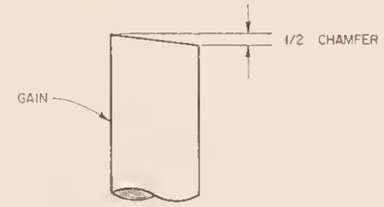
1. All Timber Poles shall conform to the 1970 State of Montana - Department of Highways "Standard Specifications."
2. All Timber Poles shall be full pressure treated as per the "Standard Specifications."
3. All cutting, trimming, and boring of Treated Poles shall conform and be in accordance with the "Standard Specifications."
4. All Poles shall be gained on the sign side a minumum as shown in the Table below for 1/2 the length of each pole as shown.
5. Break Away Details shall be standard for all Timber Woad Poles listed in the lower left hand corner Table below, either on single or multiple sign supports.
6. All Back Bracing material shall be of Standard No. 2 or better Grade S 4 S lumber, and shall meet all spec's listed in Sect. M-320.01 of the "Standard Specifications."
7. All bolts, nuts, and washers shall be of Aluminum, Stainless Steel, or Cadmium Plated Steel material.
8. A 2"x4"x12" board shall be ottached 12" from the bottom of the Pole. Attachment shall be made by driving two nails (spikes) through the 2"x4" and into the Pole. The 2"x4" shall be treated according to the Standard Specifications. The cost for all material and labor to accomplish this work shall be included in the Item — POLES - TREATED TIMBER - BARN of the contract.



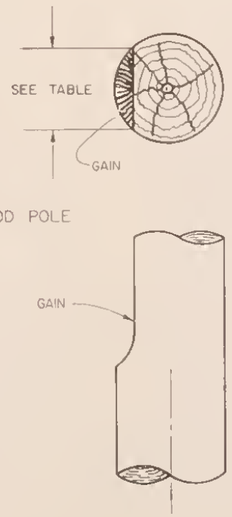

| TABLE OF BREAK-AWAY HOLE DIAMETERS, EMBEDMENTS & GAINS | | | | | | |
|---|---|---|---|---|---|---|
| POLE SIZE | A | B | C | HOLE DIA. | EMBEDMENT | GAIN |
| 3" TOP Ø | — | — | — | ——— | 3'-0" | 2-3/4" |
| 4" TOP Ø | — | — | — | ——— | 3'-0" | 3-1/2" |
| 5" TOP Ø | — | 1' | 6" | 2" | 3'-0" | 4" |
| 6" TOP Ø | — | 1' | 6" | 2" | 3'-6" | 4" |
| CLASS 4 | — | 1' | 6" | 2" | 4'-0" | 4" |
| CLASS 3 | — | 1' | 6" | 2-1/2" | 4'-0" | 4" |
| CLASS 2 | 6" | 6" | 4" | 2" | 6'-0" | 4" |
| CLASS 1 | 6" | 6" | 4" | 2-1/2" | 6'-0" | 4" |

## BREAK-AWAY DETAIL

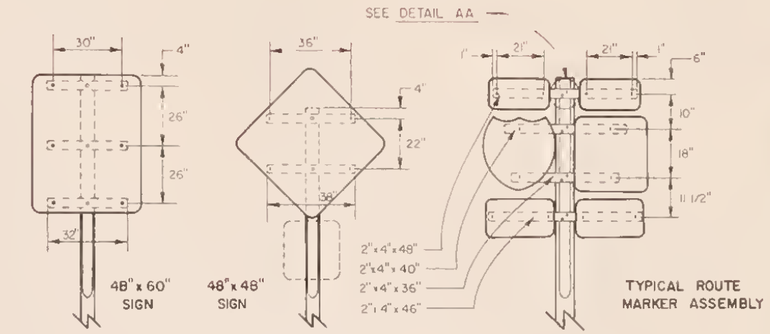
TREATED WOOD POLE; SINGLE OR MULTIPLE SIGN SUPPORT



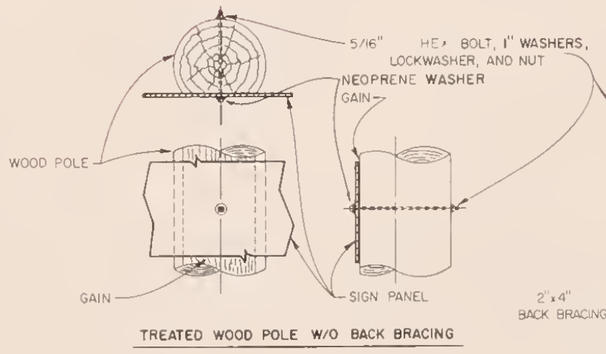

TOP END TREATMENT



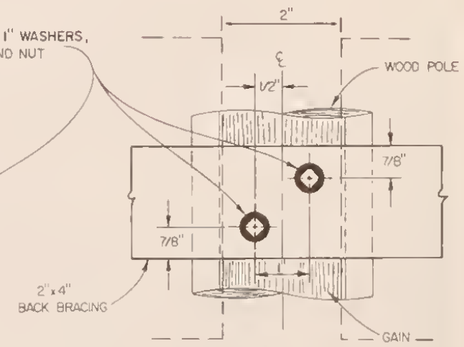

## GAIN DETAIL



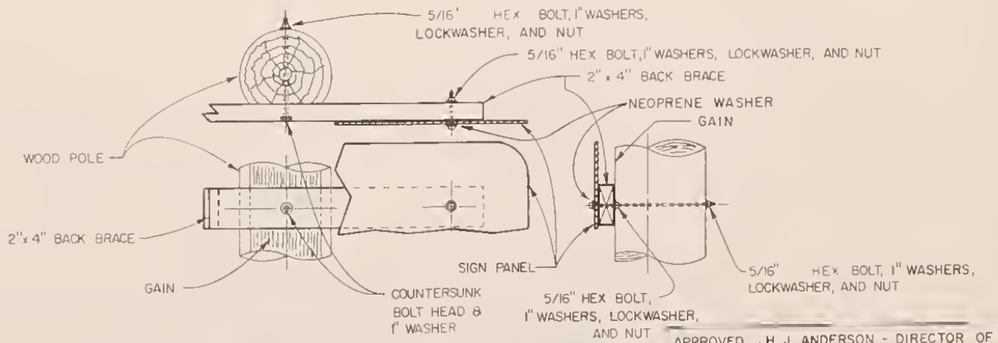

TYPICAL SIGN MOUNTINGS




TREATED WOOD POLE W/O BACK BRACING




OETAIL AA


5/16" HEX BOLT, 1" WASHERS, LOCKWASHER, AND NUT
5/16" HEX BOLT, 1" WASHERS, LOCKWASHER, AND NUT
2" x 4" BACK BRACE
NEOPRENE WASHER
GAIN
WOOD POLE
2"x4" BACK BRACE
GAIN
SIGN PANEL
COUNTERSUNK BOLT HEAD & 1" WASHER
5/16" HEX BOLT, 1" WASHERS, LOCKWASHER, AND NUT
5/16" HEX BOLT, 1" WASHERS, LOCKWASHER, AND NUT

TREATED WOOD POLE WITH BACK BRACING

APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS

BY _____
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 228

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
TREATED TIMBER POLE
SIGN SUPPORT DETAILS

| | | |
|---|---|---|
| DRAWN BY: | 3-30-73 | G. E. G. |
| CHECKED BY: | 3-30-73 | GAJ |

| | | | |
|---|---|---|---|
| REVISED | 10/11/74 | | |
| EFFECTIVE | 2-175 | | |

## R4-14

R4-14
36" x 36"
Margin = 5/8"
Border = 7/8"
Corner Radius = 2-1/4"
Black Legend and Border on a
Reflectorized White Background.

## R10-9a

R10-9a
24" x 30"
Margin = 3/8"
Border = 5/8"
Corner Radius = 1-1/2"
Black Legend and Border on a
Reflectorized White Background.

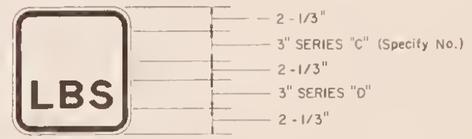
## R10-11

R10-11
24" x 30"
Margin = 3/8"
Border = 5/8"
Corner Radius = 1-1/2"
Black Legend and Border on a Reflectorized White
upper portion, and a Reflectorized White Legend on
a Black Background lower portion.

## R12-5

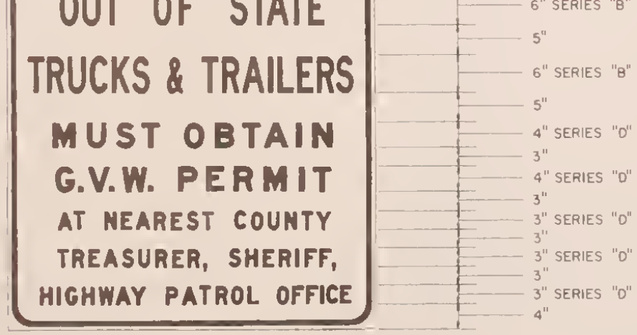
R12-5
24" x 30"
Margin = 3/8"
Border = 5/8"
Corner Radius = 1-1/2"
Black Legend and Border on a
Reflectorized White Background.

## R12-5P



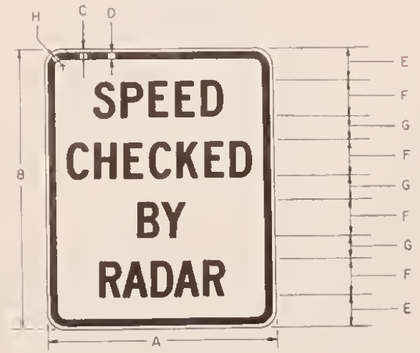

R12-5P
13" x 13"
Margin = 3/8"
Border = 5/8"
Corner Radius = 1-1/2"
Black Legend and Border on a
Reflectorized White Background.

## R13-2




R13-2
60" x 60"
Margin = 1/2"
Border = 1"
Corner Radius = 3"
Black Legend and Border on a
Reflectorized White Background.

## R2-11




R2-11 DIMENSIONS

| A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|
| 24" | 30" | 3/8" | 5/8" | 3-1/4" | 4"C | 2-1/2" | 1-1/2" |
| 48" | 60" | 3/4" | 7/8" | 6-1/2" | 8"C | 5" | 3" |

Black Legend and Border on a
Reflectorized White Background.

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: Jack R Vorbert
ADMINISTRATOR - ENGINEERING DIVISION

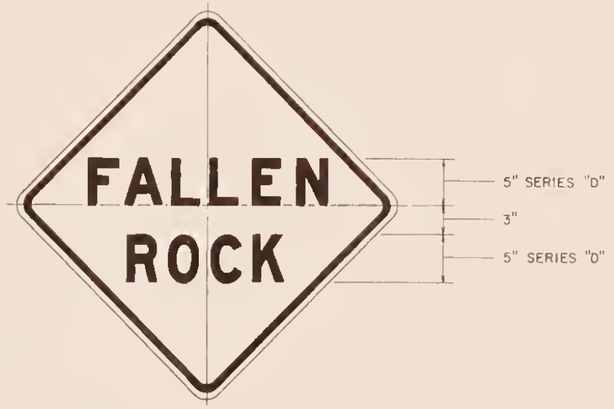
SIGNING
STANDARD DRAWING NO. 232

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
SPECIAL DESIGN REGULATORY SIGNS

| | | |
|---|---|---|
| DRAWN BY: | 5-15-73 | G. E. G |
| CHECKED BY: | 5-16-73 | C. H. L. |

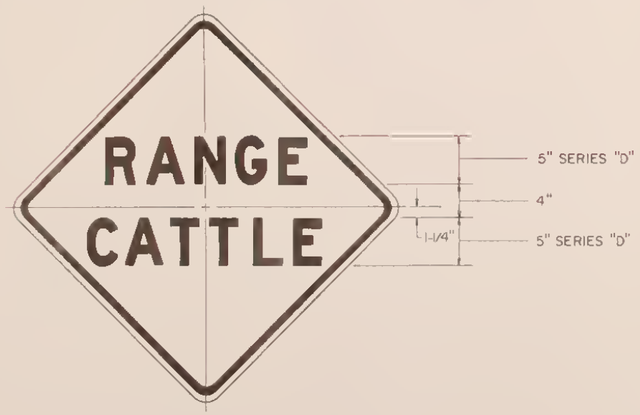
| | | | |
|---|---|---|---|
| REVISED | 10/11/74 | | |
| EFFECTIVE | 2/1/75 | | |

## W 8 - 9



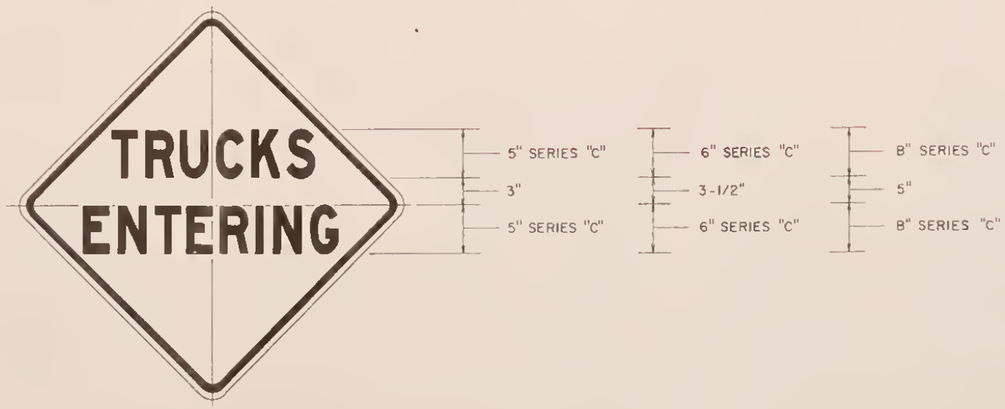

W8 - 9
30" x 30"
Margin = 1/2"
Border = 3/4"
Corner Radius = 1-7/8"
Black Legend and Border on a
Reflectorized Yellow Background.

## W 11 - 7




W 11 - 7
30" x 30"
Margin = 1/2"
Border = 3/4"
Corner Radius = 1-7/8"
Black Legend and Border on a
Reflectorized Yellow Background.

## W 11 - 8




W 11 - 8
30" x 30"
Margin = 1/2"
Border = 3/4"
Corner Radius = 1-7/8"

W 11 - 8
36" x 36"
Margin = 5/8"
Border = 7/8"
Corner Radius = 2-1/4"

W 11 - 8
48" x 48"
Margin = 3/4"
Border = 1-1/4"
Corner Radius = 3"

Black Legend and Border on a
Reflectorized Yellow Background.

| | | |
|---|---|---|
| DRAWN BY: | 5-30-73 | G. E. G. |
| CHECKED BY: | 5-31-73 | C. H. L. |

| | | | |
|---|---|---|---|
| REVISED | 10/15/74 | | |
| EFFECTIVE | 2/1/75 | | |

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY Jack P. Sackett
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 233

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
SPECIAL DESIGN WARNING SIGNS

# PANELS

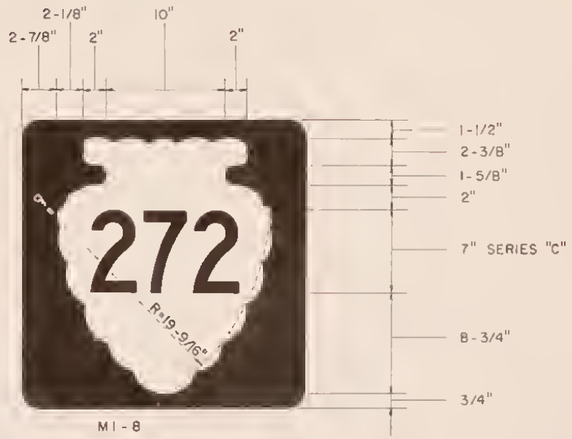
FOR ROUTE MARKER ASSEMBLY USE

## M1-6

M1-6
24" x 24"
Margin = None
Border = 1-1/2"
Corner Radius = 1-1/2"
Black Legend and Border on a
Reflectorized White Background.

M1-6
30" x 24"
Margin = None
Border = 1-1/2"
Corner Radius = 1-1/2"
Black Legend and Border on a
Reflectorized White Background.

## M1-8

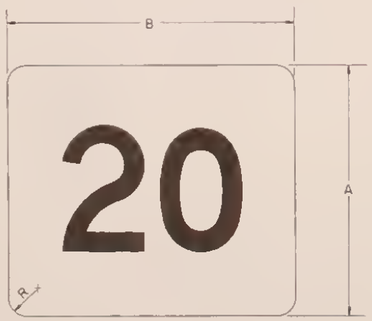



M1-8
24" x 24"
Margin = None
Border = See design above.
Corner Radius = 1-1/2"
Black Legend and Border on a
Reflectorized White Background.

# SHIELDS

FOR USE ON GUIDE SIGNS

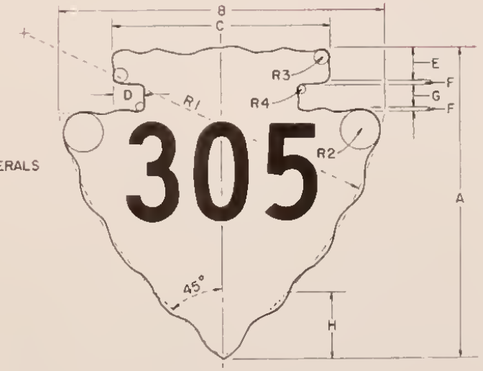
SERIES "D" NUMERALS




| | 10" NUM. | | 12" NUM. | | 18" NUM. | |
|---|---|---|---|---|---|---|
| | 2 DIGIT | 3 DIGIT | 2 DIGIT | 3 DIGIT | 2 DIGIT | 3 DIGIT |
| A | 21" | 21" | 24" | 24" | 36" | 36" |
| B | 24" | 30" | 24" | 30" | 36" | 45" |
| R | 1-1/2" | 1-1/2" | 2" | 2" | 2-1/2" | 2-1/2" |

Black Legend on a Reflectorized
White Background with no Border.

SERIES "C" NUMERALS




| NUMERAL SIZE | A | B | C | D | E | F | G | H | R1 | R2 | R3 | R4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| * 8" "C" | 26" | 28" | 18-1/2" | 2-5/8" | 3" | 5/16" | 2" | 5-1/2" | 32" | 1-3/4" | 5/8" | 5/16" |
| * * 10" "C" | 32" | 34" | 22-1/2" | 3-1/4" | 3-5/8" | 3/8" | 2-1/2" | 6-3/4" | 38-1/2" | 2" | 3/4" | 3/8" |
| * * * 12" "C" | 40" | 42" | 28" | 4" | 4-1/2" | 1/2" | 3" | 8-7/16" | 48" | 2-1/2" | 1" | 1/2" |

Black Legend on a Reflectorized White Background.
* To be used with standard 24" U. S. Shield.
* * To be used with standard 30" & 36" U. S. Shield.
* * * To be used with standard 42" U.S. Shield & all independent use.

NOTE.

All numerals used on Panels and Shields are, and shall be, optically spaced about vertical centerline.

| | | |
|---|---|---|
| DRAWN BY: | 5-21-73 | G. E. G. |
| CHECKED BY: | 5-22-73 | C. H. L. |

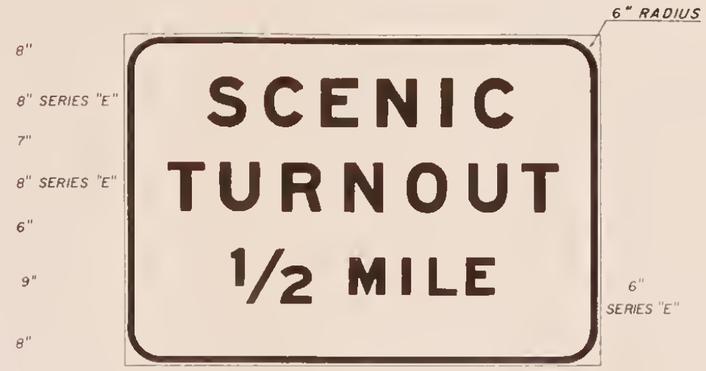
| | | | |
|---|---|---|---|
| REVISED | 10/15/74 | | |
| EFFECTIVE | 2 1/75 | | |

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: Jack D. Beaulaf
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 234

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
SPECIAL DESIGN PRIMARY & SECONDARY ROUTE MARKER PANELS AND SHIELDS

D5-1 8'-0" x 3'-0"
8" SERIES "E" NUMERAL



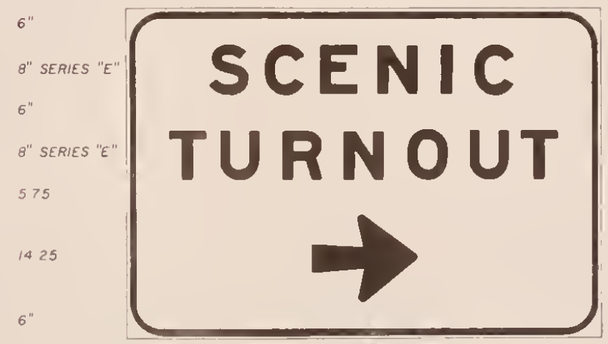

D6-4 6'-6" x 4'-6"

D5-5B 4'-0" x 3'-6"

N6-4a 7'-0" x 4'-0"
No Scale
WHITE LEGEND ON GREEN BACKGROUND

NOTE:
HISTORIC POINT SIGNS SHALL HAVE BROWN BACKGROUND WITH WHITE LEGEND
ALL OTHERS SHALL HAVE BLUE BACKGROUND WITH WHITE LEGEND.
ALL BACKGROUND AND LEGEND SHALL BE REFLECTORIZED.

D5-2R 6'-6" x 3'-0"
D5-2L 6'-6" x 3'-0" REVERSE ARROW
TYPE "B" ARROW 14 25" x 17 25"




D6-6R 6'-6" x 4'-6"
D6-6L 6'-6" x 4'-6" REVERSE ARROW
TYPE "B" ARROW 14 25" x 17 25"

05-5R 4'-0" x 3'-6"
D5-5L 4'-0" x 3'-6" REVERSE ARROW
TYPE "B" ARROW 8 44" x 9 56"

D9-4 3'-6" x 3'-6"

D9-6R 3'-6" x 3'-6"
D9-6L 3'-6" x 3'-6" REVERSE ARROW
TYPE "B" ARROW 8 44" x 9 56"

D7-3L 4'-0" x 3'-0" x 2'-6"
D7-3R 4'-0" x 3'-0" x 2'-6 REVERSE PANEL

07-4L 4'-0" x 3'-0" x 2'-6"
D7-4R 4'-0" x 3'-0" x 2'-6" REVERSE PANEL AND ARROW
TYPE "B" ARROW 8 44" x 9 56"

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY _____
ADMINISTRATOR - ENGINEERING DIVISION

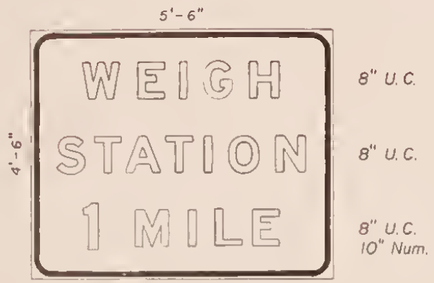
SIGNING
STANDARD DRAWING NO. 236

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
LAYOUT DETAILS FOR STANDARD
INFORMATION SIGNS ON
PRIMARY & SECONDARY HIGHWAYS

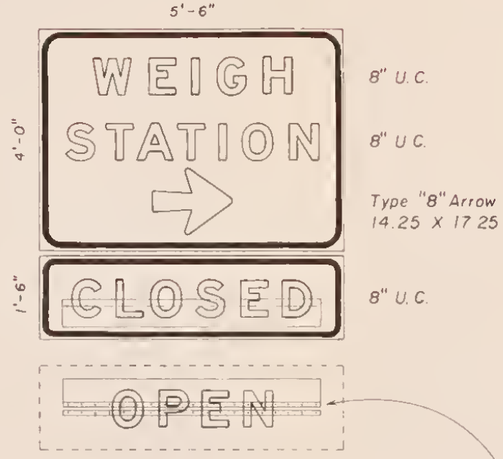
| | | |
|---|---|---|
| DRAWN BY: | 3-30-73 | G. E. G. |
| CHECKED BY: | 3-30-73 | C. H. L. |

| | | | |
|---|---|---|---|
| REVISED | 10/15/76 | | |
| EFFECTIVE | 2/1/75 | | |

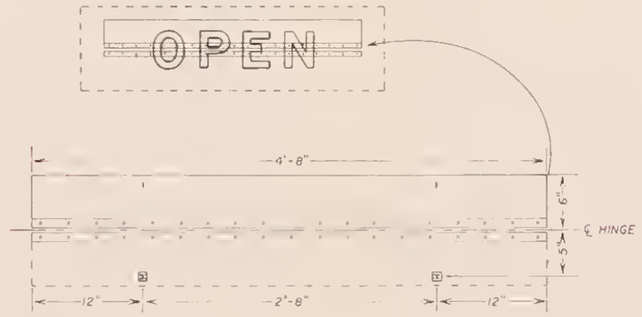
## D8-1a




## D8-2a



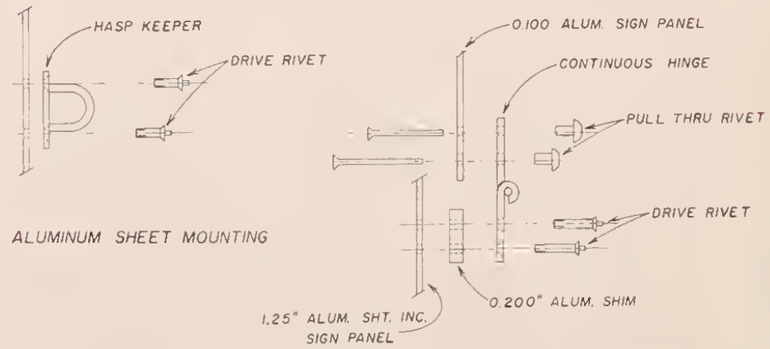

## D8-2aP

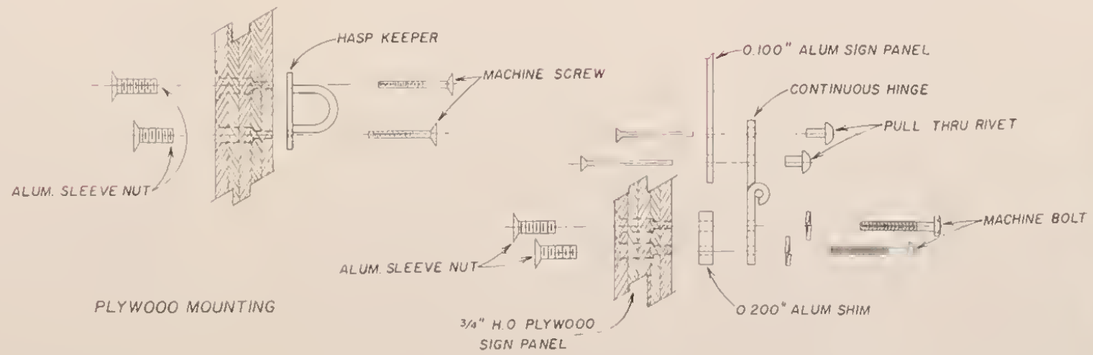



## R13-1a

NOTES.

1. **O8-1a & D8-2a** Signs shall have WHITE REFLECTORIZED legend on a GREEN REFLECTORIZED background.
2. **RI3-1a** Sign shall have WHITE REFLECTORIZED legend on a **Nonreflectorized** BLACK background.
3. The sign panel shall be 3/4" HIGH DENSITY PLYWOOD or .125" ALUMINUM SHEET INCREMENT. The hinged panel shall be 0.100" SHEET ALUMINUM
4. All hardware visible on the sign face shall be painted the same color as the sign
5. Shop drawings shall be submitted and approved prior to fabrication.
6. **O8-1a** may have variable distance legend
7. All legend shall have SERIES "E" MODIFIED letters
8. Open-Closed sign panel below **D8-2a** shall have WHITE REFLECTORIZED legend on a BLACK background. **(O8-2aP)**
9. **The maunting height to the bottom of the SECONDARY PANEL (D8-2aP) shall be 4'**




APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: _____
ADMINISTRATOR - ENGINEERING DIVISION

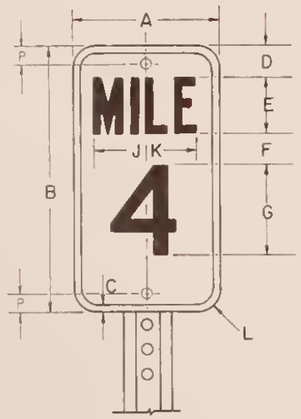
SIGNING
STANDARD DRAWING NO. 237

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
WEIGH STATION SIGN DESIGN
DETAILS FOR PRIMARY HIGHWAYS

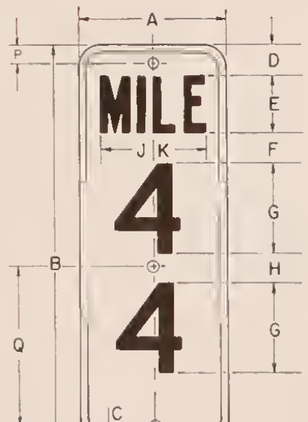
| | | |
|---|---|---|
| DRAWN BY: | 3-30-73 | G. E. G. |
| CHECKED BY: | 3-30-73 | G A J |

| | | | |
|---|---|---|---|
| REVISED | 10/15/74 | | |
| EFFECTIVE | 2/1/75 | | |

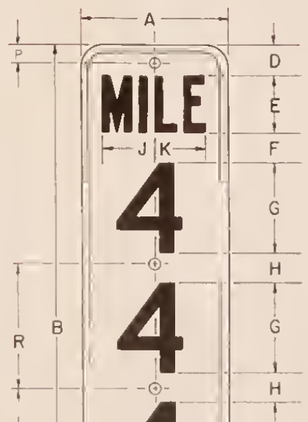
D 10-1
ONE DIGIT




D 10-2
TWO DIGIT




D 10-3
THREE DIGIT




P001 PRIMARY

S201 SECONDARY

1015 INTERSTATE

NOTES:

1 IN CASE OF A NEW SIGNING PROJECT THE CONTRACTOR SHALL PLACE ROUTE NUMBER IDENTIFICATION STICKERS UPON ALL SIGNS BEFORE FINAL ACCEPTANCE OF THE PROJECT. THE COST FOR THE LABOR TO ACCOMPLISH THIS WORK SHALL BE INCLUDED IN THE SHEET ALUMINUM & OR ALUMINUM SHEET INCREMENT ITEMS OF THE CONTRACT

2 THE STICKER SHALL DISPLAY THE FEDERAL AID ROUTE NUMBER & SHALL BE PLACED IN THE LOWER LEFT CORNER OF THE MILEPOST SIGN, NEAREST THE EDGE OF ROADWAY

3 THE STICKERS SHALL BE AVAILABLE IN THE DIVISION MAINTENANCE OFFICES THE STICKERS ARE MADE AND CAN BE ORDERED FROM THE DEPARTMENTS SIGN SHOP IN HELENA

MILEPOST PANEL DIMENSION INFORMATION

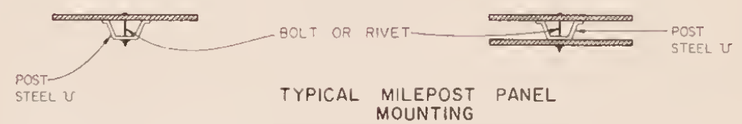
| INTERSTATE | | | |
|---|---|---|---|
| KEY | 1-DIGIT | 2-DIGIT | 3-DIGIT |
| A | 12.0 | 12.0 | 12.0 |
| B | 24.0 | 36.0 | 48.0 |
| C | 0.5 | 0.5 | 0.5 |
| D | 3.0 | 3.0 | 3.0 |
| E | 4.C | 4.C | 4.C |
| F | 3.0 | 3.0 | 3.0 |
| G* | 10.C | 10.C | 10.C |
| H | - | 3.0 | 2.5 |
| J | 4.6 | 4.6 | 4.6 |
| K | 4.B | 4.B | 4.B |
| L | 1.5R | 1.5R | 1.5R |
| P | 2.0 | 2.0 | 2.0 |
| O | - | 13.0 | 12.0 |
| R | - | - | 13.0 |

| PRIMARY & SECONDARY | | | |
|---|---|---|---|
| KEY | 1-DIGIT | 2-DIGIT | 3-DIGIT |
| A | 10.0 | 10.0 | 10.0 |
| B | 18.0 | 27.0 | 36.0 |
| C | 0.5 | 0.5 | 0.5 |
| D | 2.0 | 2.0 | 2.0 |
| E | 4.B | 4.B | 4.B |
| F | 2.0 | 2.0 | 2.0 |
| G* | 6.C | 6.C | 6.C |
| H | - | 3.0 | 3.0 |
| J | 3.6 | 3.6 | 3.6 |
| K | 3.B | 3.B | 3.B |
| L | 1.5R | 1.5R | 1.5R |
| P | 1.5 | 1.5 | 1.5 |
| O | - | 10.0 | 10.0 |
| R | - | - | 9.0 |

* DIGITS SHOULD BE OPTICALLY CENTERED ON VERTICAL ℄ OF MILEPOST PANEL.

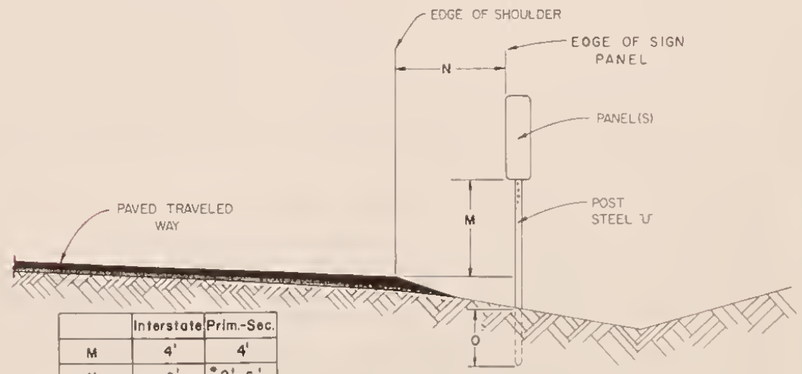
ABOVE VALUES ARE IN INCHES

SINGLE PANEL DOUBLE PANEL




TYPICAL MILEPOST PANEL MOUNTING

1/4" BOLT, NUT AND WASHER SHALL BE GALVANIZED OR CADMIUM PLATED (Jam threads after tightening).
1/4" RIVETS SHALL BE ALUMINUM OR CADMIUM PLATED.
PAINT BOLT HEADS OR RIVET HEADS WITH BRILLIANT GREEN SIGN ENAMEL.
D10-1 use two (2) bolts or rivets.
D10-2 use three (3) bolts or rivets.
D10-3 use four (4) bolts or rivets.




| | Interstate | Prim.-Sec. |
|---|---|---|
| M | 4' | 4' |
| N | 6' | *2'-6' |
| O | 2' Min. | 2' Min. |

* NORMALLY IN LINE WITH DELINEATORS.

TYPICAL MILEPOST LOCATION

NOTES:

1. MILEPOST PANEL SHALL HAVE A REFLECTIVE WHITE LEGEND AND BORDER ON A REFLECTIVE GREEN BACKGROUND MOUNTED ON A STEEL U POST.
2. SECTION 2D-47 OF THE 1971 FHWA M.U.T.C.D. SHALL GOVERN ALL MILEPOST APPLICATIONS.
3. ONCE A MILEPOST HAS BEEN PROPERLY LOCATED AND SET, AT NO TIME SHALL IT BE MOVED FROM THAT LOCATION, EXCEPT WHERE A TRAFFIC ENGINEERING INVESTIGATION REQUIRES ITS RESETTING.
4. ALL MILEPOSTS SHALL BE MOUNTED ON A 2 LB/FT MIN. STEEL U POST, EXCEPT THE INTERSTATE D10-3. THE INTERSTATE D10-3 SHALL BE MOUNTED ON A 3 LB/FT MIN. STEEL U POST. THIS WILL BE NOTED IN THE SIGNING PLANS.

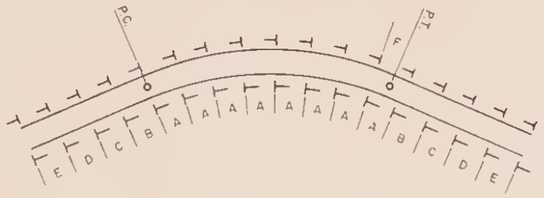
| | | |
|---|---|---|
| DRAWN BY: | 3-30-73 | G. E. G. |
| CHECKED BY: | 3-30-73 | GAJ |

| | | | |
|---|---|---|---|
| REVISED | 10/16/74 | | |
| EFFECTIVE | 2/1/75 | | |

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: [signature]
ADMINISTRATOR - ENGINEERING DIVISION

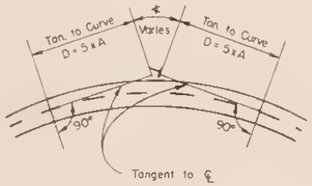
SIGNING
STANDARD DRAWING NO. 241

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
MILEPOST DETAILS




DELINEATOR PLACEMENT

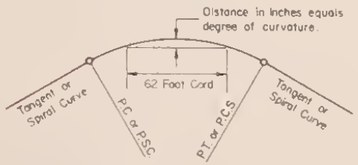
FIGURE A




Position delineator faces perpendicular to tangent to center line of curve as shown right. Spacing shall be as shown in Table I

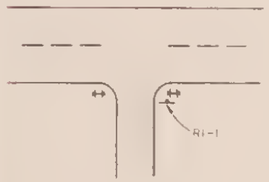
DELINEATOR PLACEMENT

FIGURE B


Distance in inches equals degree of curvature.
62 Foot Cord
Tangent or Spiral Curve
P.C. or P.S.C.
P.T. or P.C.S.
Tangent or Spiral Curve

FIELD METHOD FOR DETERMINING DEGREE OF HORIZONTAL CURVES

FIGURE C




TYPICAL DESIGN FOR APPROACH ROAD

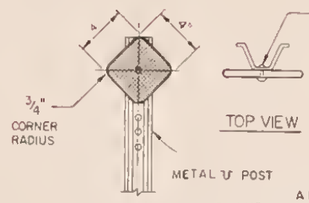
FIGURE "D"

## TABLE I

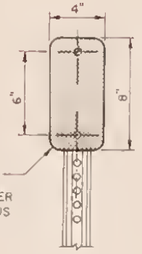
HORIZONTAL CURVE SPACING TABLE

| DEGREE OF CURVE | SPACING A ON CURVE | SPACING ON BOTH TANGENTS B | C | D | E |
|---|---|---|---|---|---|
| 0° TO 30' | 400' | 400' | 400' | 400' | 400' |
| 30' TO 1° | 400' | 400' | 400' | 400' | 400' |
| 1°+ TO 2° | 250' | 400' | 400' | 400' | 400' |
| 2°+ TO 3° | 175' | 400' | 400' | 400' | 400' |
| 3°+ TO 4° | 120' | 240' | 400' | 400' | 400' |
| 4°+ TO 6° | 90' | 180' | 270' | 400' | 400' |
| 6°+ TO 8° | 85' | 170' | 255' | 400' | 400' |
| 8°+ TO 12° | 75' | 150' | 225' | 400' | 400' |
| 12°+ TO 20° | 60' | 120' | 180' | 400' | 400' |
| 20° PLUS | 40' | 80' | 120' | 240' | 400' |

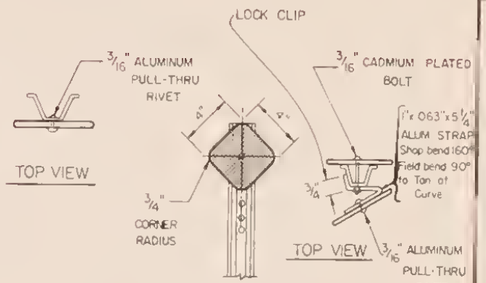
(SEE FIGURE A ABOVE FOR SPACING DIAGRAM)


4"
4"
3/16" ALUMINUM PULL-THRU RIVET
TOP VIEW
3/4" CORNER RADIUS
METAL U POST
A MINIMUM OF 12, 1/4" Ø HOLES, SHALL BE DRILLED OR PUNCHED ON 1" CENTERS FROM THE TOP OF THE POST

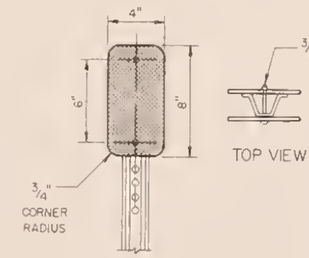
DESIGN "A" (SILVER)



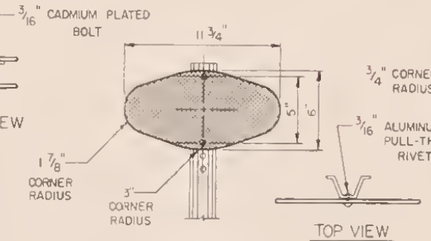

DESIGN "B" (AMBER)


LOCK CLIP
3/16" CADMIUM PLATED BOLT
1" x .063" x 5 1/4" ALUM STRAP Shop bend 160° Field bend 90° to Tan at Curve
4"
4"
3/4" CORNER RADIUS
3/16" ALUMINUM PULL-THRU RIVET
TOP VIEW

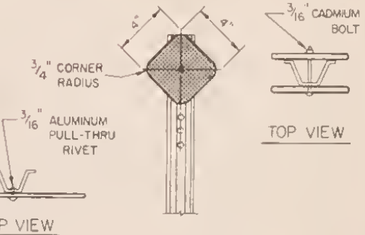
DESIGN "C" (SILVER, BI-DIRECTIONAL, ADJUSTABLE)




DESIGN "D" (AMBER, BI-DIRECTIONAL)




DESIGN "E" (AMBER)




DESIGN "F" (SILVER, BI-DIRECTIONAL)

1. ALL DELINEATORS SHALL BE OF THE DESIGN SHOWN ON THIS SHEET. REFLECTIVE SHEETING SHALL BE FURNISHED ACCORDING TO STANDARD SPECIFICATIONS FOR ENCAPSULATED LENS, WIDE ANGLE
2. DELINEATORS SHALL BE MOUNTED ON METAL U POSTS OF THE TYPE SHOWN FOR DESIGN "A" DELINEATOR. THE DELINEATORS MAY HAVE ROUND OR SQUARE MOUNTING HOLES. IF SQUARE HOLES ARE USED, A LARGE HEADED RIVET OR BOLT, OR AN APPROPRIATE WASHER, MUST BE USED. WHERE BOLTS ARE USED, THE THREADS MUST BE JAMMED AFTER TIGHTNING THE NUT TO PREVENT REMOVAL.
3. DELINEATORS SHALL BE PLACED AT A CONSTANT DISTANCE FROM THE EDGE OF THE ROADWAY EXCEPT WHERE A GUARD-RAIL OR OTHER OBSTRUCTION INTERFERES DELINEATORS SHALL THEN BE IN LINE WITH THE INSIDE EDGE OF THE OBSTRUCTION OR BEHIND GUARDRAIL. NORMAL PLACEMENT SHALL BE TO THE RIGHT OF THE ROADWAY FACING ONCOMING TRAFFIC CLEARANCE FOR DELINEATORS SHALL BE 6'-0" ON INTERSTATE HIGHWAYS, 2'-0" TO 6'-0" ON PRIMARY AND SECONDARY HIGHWAYS STANDARD MOUNTING HEIGHT SHALL BE 4'-0"
4. DELINEATORS SHALL BE SPACED ACCORDING TO THE DISTANCES FOUND IN TABLE I. IF DELINEATORS ARE TO BE SPACED DIFFERENTLY, IT WILL BE NOTED IN THE PLANS AS TO THEIR PLACEMENT IF, IN FIGURE A, "F" DISTANCE IS GREATER THAN 20 FEET, ADD ONE REGULAR DELINEATOR IN AT "A" DISTANCE SPACING. WHERE, UNDER NORMAL SPACING, A DELINEATOR SHOULD FALL WITHIN A CROSSROAD OR AN APPROACH, THAT DELINEATOR MAY BE MOVED IN EITHER DIRECTION A DISTANCE NOT TO EXCEED ONE QUARTER OF THE NORMAL SPACING. DELINEATORS STILL FALLING WITHIN SUCH AREAS SHOULD BE ELIMINATED. (SEE FIGURES A, B, AND D.)
5. FOR PLANS SHOWING CONTINUOUS DELINEATION OF A ROADWAY, DESIGN "A" DELINEATORS SHALL BE EQUALLY SPACED 400 FEET APART, UNLESS DIFFERENTLY NOTED IN THE PLANS AS TO SPACING AND PLACEMENT. CURVE SECTIONS SHALL FOLLOW SPACINGS LISTED IN TABLE I, AND AS SHOWN IN FIGURE A.
6. FIGURE C SHOWS THE FIELD METHOD FOR DETERMINING THE DEGREE OF A CURVE FOR PLACEMENT AND SPACING OF DELINEATORS WHEN PERTINENT INFORMATION CONCERNING THAT CURVE IS NOT OBTAINABLE.
7. TABLE II SHOWS THE PROPER SYMBOLS FOR THE VARIOUS DESIGN DELINEATORS, AND SHALL BE NOTED AS SUCH THROUGHOUT THE PLANS FOR PROPER DELINEATOR APPLICATION.
8. IF DELINEATION IS CONSIDERED NECESSARY TO DELINEATE AN APPROACH WITH OR WITHOUT AN RI-1 IT SHALL BE OF THIS TYPICAL DESIGN. (SEE FIGURE "D")
9. DELINEATOR POST LENGTHS SHALL BE 6'-6" FOR INTERSTATE HIGHWAYS, 7'-0" FOR PRIMARY AND SECONDARY HIGHWAYS.

## TABLE II

| DELINEATOR | LEGEND |
|---|---|
| DESIGN "A" | ⊣ |
| DESIGN "B" | ⊣⊢ |
| DESIGN "C" | ⊢∨ |
| DESIGN "D" | ⊣⊢⊢ |
| DESIGN "E" | ⊣⊢⊢⊢ |
| DESIGN "F" | ⊢⊢ |

## TABLE III

PHOTOMETRIC SPECIFICATIONS FOR ENCAPSULATED LENSES AND WIDE ANGLE REFLECTIVE SHEETING DELINEATORS

| COLOR | SILVER | | | | YELLOW-AMBER | | | |
|---|---|---|---|---|---|---|---|---|
| DIVERGENCE ANGLE | 1/3° | | | | 1/3° | | | |
| INCIDENCE ANGLE | 0° | 15° | 30° | 45° | 0° | 15° | 30° | 45° |
| VALUE | 450 | 420 | 375 | 100 | 175 | 165 | 150 | 90 |

APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS

BY _____ ADMINISTRATOR - ENGINEERING DIVISION

SIGNING

STANDARD DRAWING NO. 242

STATE OF MONTANA

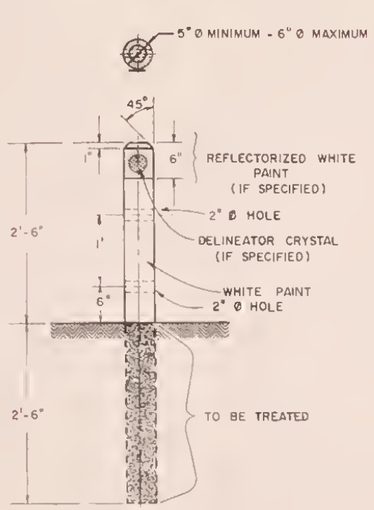
DEPARTMENT OF HIGHWAYS

DELINEATOR DESIGN AND PLACEMENT DETAILS

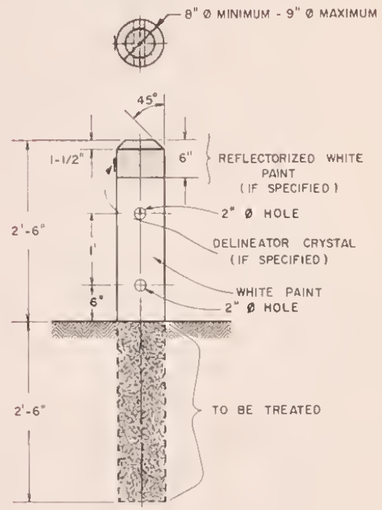
| | | | |
|---|---|---|---|
| DRAWN BY: | 3-30-73 | G. E. G. | |
| CHECKED BY: | 3-30-73 | GAJ | |

| | | | |
|---|---|---|---|
| REVISED | 10/16/74 | | |
| EFFECTIVE | 2/1/75 | | |

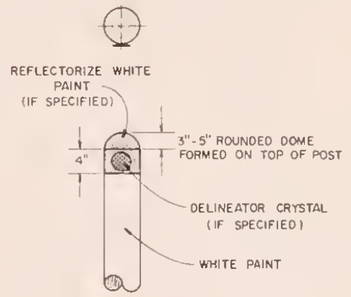
## 5" DIAMETER WOOD GUIDE POST



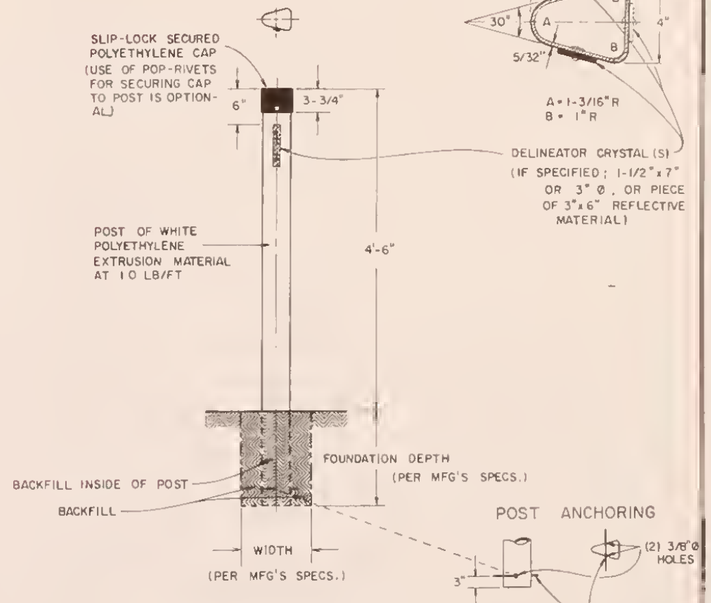

## 8" DIAMETER WOOD GUIDE POST



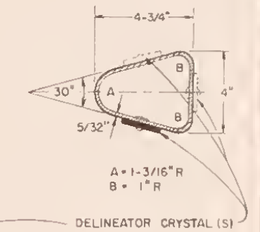

## ALTERNATE TOP END FINISH FOR ROUND WOOD GUIDE POSTS


REFLECTORIZE WHITE PAINT (IF SPECIFIED)
3"-5" ROUNDED DOME FORMED ON TOP OF POST
4"
DELINEATOR CRYSTAL (IF SPECIFIED)
WHITE PAINT

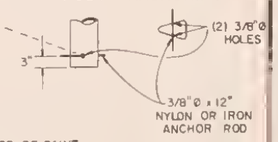
## FLEXIBLE GUIDE POST


SLIP-LOCK SECURED POLYETHYLENE CAP (USE OF POP-RIVETS FOR SECURING CAP TO POST IS OPTIONAL)
6"
3-3/4"
DELINEATOR CRYSTAL (S) (IF SPECIFIED; 1-1/2"x7" OR 3" Ø, OR PIECE OF 3"x6" REFLECTIVE MATERIAL)
POST OF WHITE POLYETHYLENE EXTRUSION MATERIAL AT 10 LB/FT
4'-6"
FOUNDATION DEPTH (PER MFG'S SPECS.)
BACKFILL INSIDE OF POST
BACKFILL
WIDTH (PER MFG'S SPECS.)

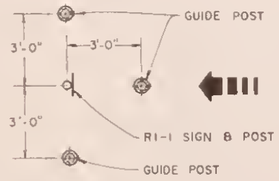
### POST CROSS SECTION



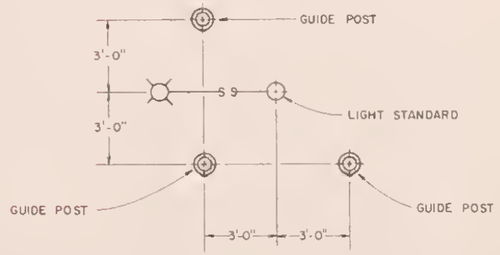

### POST ANCHORING



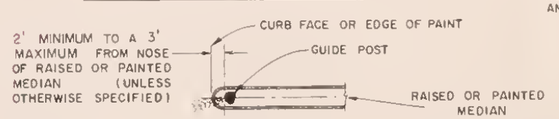

## TYPICAL USE AND PLACEMENT




## TYPICAL USE AND PLACEMENT




## TYPICAL USE AND PLACEMENT


2' MINIMUM TO A 3' MAXIMUM FROM NOSE OF RAISED OR PAINTED MEDIAN (UNLESS OTHERWISE SPECIFIED)
CURB FACE OR EDGE OF PAINT
GUIDE POST
RAISED OR PAINTED MEDIAN

## NOTES

### WOOD GUIDE POSTS

1. WOOD GUIDE POSTS SHALL CONFORM TO THE APPLICABLE PROVISIONS OF THE STANDARD SPECIFICATIONS FOR ROAD & BRIDGE CONSTRUCTION.
2. THE PORTION OF THE WOOD GUIDE POST THAT IS TO BE IN THE GROUND SHALL BE TREATED FOR PROTECTION AS PER THE STANDARD SPECIFICATIONS.
3. THE PORTION OF THE WOOD GUIDE POST THAT IS TO BE ABOVE GROUND SHALL BE PAINTED WITH TWO (2) COATS OF WHITE PAINT AS PER THE STANDARD SPECIFICATIONS.
4. CONTRACTOR HAS CHOICE OF TOP END FINISH FOR WOOD GUIDE POSTS. ALL WOOD GUIDE POSTS FURNISHED ON CONTRACT SHALL HAVE THE SAME TOP END FINISH THROUGHOUT.
5. REFLECTORIZATION OF WOOD GUIDE POSTS, IF REQUIRED IN PLAN SPECIFICATIONS, SHALL BE ACCOMPLISHED BY (5 CONT'D) APPLYING WHITE REFLECTORIZED PAINT ON THE TOP 6 INCH PORTION, AND/OR THE INSTALLATION OF DELINEATOR CRYSTALS AS SPECIFIED.
6. THE EXACT TYPE OF WOOD GUIDE POSTS TO BE USED, THEIR LOCATION, SHALL BE FOUND DETAILED IN THE SIGNING PLANS OF THE CONTRACT.

### FLEXIBLE GUIDE POSTS

1. FLEXIBLE GUIDE POSTS SHALL CONFORM TO THE DESIGN AND SPECIFICATIONS DETAILED ON THIS SHEET.
2. FLEXIBLE GUIDE POSTS SHALL BE EMBEDDED TO THE MANUFACTURERS' SPECIFIED FOUNDATION DEPTH WITH THEIR SPECIFIED FOUNDATION WIDTH USING THE POST ANCHORING DESIGN AS DETAILED.
3. THE HOLLOW POST PORTION TO BE IN THE GROUND SHALL BE BACKFILLED INSIDE WITH THE SAME MATERIAL AS THE (3 CONT'D) FOUNDATION.
4. REFLECTORIZATION OF FLEXIBLE GUIDE POST, IF REQUIRED IN PLAN SPECIFICATIONS, SHALL BE ACCOMPLISHED BY THE ADDITION OF DELINEATOR CRYSTALS, EITHER 1-1/2" x 7" OR 3" DIAMETER, OR BY ADDING A 3" x 6" PIECE OF TYPE II REFLECTIVE SHEETING. THE COLOR OF THE DELINEATOR CRYSTALS OR REFLECTORIZED MATERIAL SHALL BE FOUND DETAILED IN THE SIGNING PLANS OF THE CONTRACT.
5. THE EXACT LOCATION AND PLACEMENT OF THE FLEXIBLE GUIDE POSTS SHALL BE FOUND DETAILED IN THE SIGNING PLANS.

➡ = DIRECTION OF VEHICULAR TRAVEL

| | | |
|---|---|---|
| DRAWN BY: | 5-23-73 | G. E. G. |
| CHECKED BY: | 6-1-73 | C. H. L |

| | | | |
|---|---|---|---|
| REVISED | 01672 | | |
| EFFECTIVE | 2/1/75 | | |

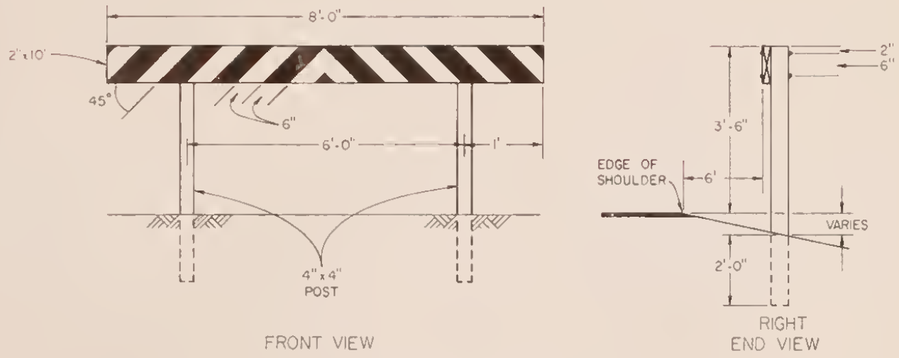
APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS

BY _____
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 244

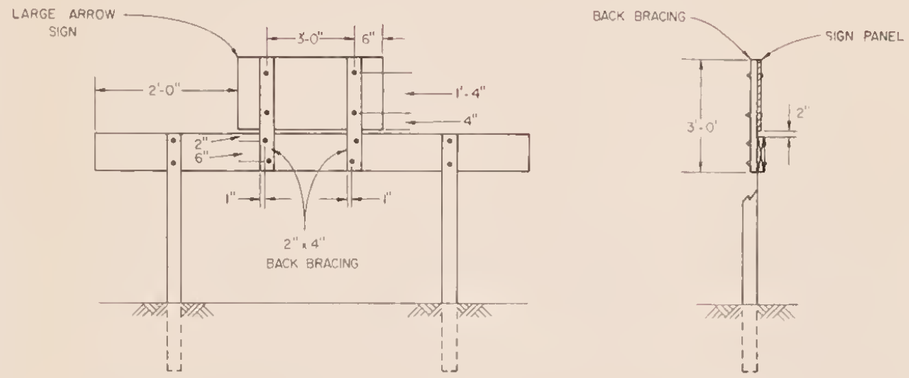
STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
GUIDE POST DESIGN AND PLACEMENT DETAILS

# TYPE I-A BARRICADE




FRONT VIEW — RIGHT END VIEW

GENERAL BARRICADE DETAILS




REAR VIEW — LEFT END VIEW

AUXILLARY SIGN MOUNTING DETAILS

## NOTES

1. ALL BARRICADES SHALL BE CONSTRUCTED OF COMMERCIAL GRADE S4S LUMBER. USE $\frac{3}{8}$" CARRIAGE OR CADMIUM PLATED BOLTS, WASHERS, AND NUTS FOR ALL CONNECTIONS.

2. ALL BARRICADES SHALL BE PAINTED WITH 2 COATS OF BLACK PAINT IN ACCORDANCE WITH SECTION M-280.02, (2) AND (9) OF THE STANDARD SPECIFICATIONS MANUAL, OF THE DEPARTMENT OF HIGHWAYS — STATE OF MONTANA.

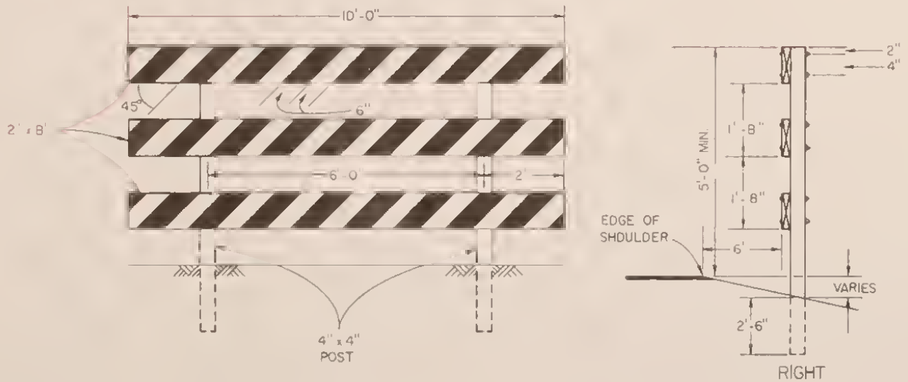
3. ALL BARRICADES SHALL HAVE ALTERNATING REFLECTIVE BLACK AND WHITE STRIPES, 6" IN WIDTH AT AN ANGLE OF 45° WITH THE VERTICAL, SLANTING DOWNWARD TOWARD THE SIDE OR SIDES ON WHICH TRAFFIC IS TO FLOW.

4. ALL BARRICADES SHALL BE REFLECTORIZED WITH SILVER SHEETING MOUNTED ON A SHEET ALUMINUM BACKING AT LEAST 0.019" THICK. ALUMINUM ALLOY 6061-T6 CONFORMING TO A S T. M. DESIGNATION B-209 SHALL BE USED. THIS REFLECTIVE ALUMINUM SHEETING SHALL BE SECURED WITH ALUMINUM NAILS.

5. POST LENGTHS SHALL BE DETERMINED IN THE FIELD, TO COMPLY WITH THE MOUNTING HEIGHTS AND FOUNDATION DEPTHS LISTED ON THIS SHEET, DUE TO VARIABLE SLOPES, CUTS, OR FILLS.

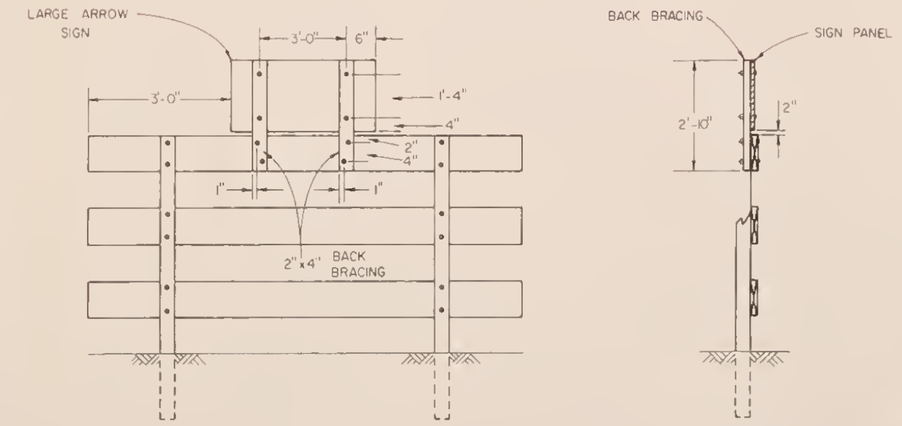
6. SECTION 6C-2,6, AND 7 OF THE FEDERAL HIGHWAY ADMINISTRATION'S M.U.T.C.D., 1971 EDITION, SHALL GOVERN CONSTRUCTION USE OF BARRICADES

7. THE TYPE I-A OR III A DESIGNATES THAT THESE BARRICADES ARE TO BE SET IN THE GROUND. TYPE I, II & III MOVABLE BARRICADES SHALL BE CONSTRUCTED PER CONST STD DWG NO 210




FRONT VIEW — RIGHT END VIEW

GENERAL BARRICADE DETAILS




REAR VIEW — LEFT END VIEW

AUXILLARY SIGN MOUNTING DETAILS

# TYPE III-A BARRICADE

| | | |
|---|---|---|
| DRAWN BY: | 3-30-73 | G. E. G. |
| CHECKED BY: | 3-30-73 | GAJ |

| | | | |
|---|---|---|---|
| REVISED | 10 1E 12 | | |
| EFFECTIVE | 2 1 75 | | |

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY Jack R Bechtel
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 245

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
PERMANENT TYPE BARRICADE
DESIGN DETAILS

**S 2-1S**

6" U.C. SERIES "D"

4" U.C. SERIES "B"

36" x 18" SUPPLEMENTAL TO ALL S2-1's
BLACK on WHITE

**S1-1S**

6" NUMERAL SERIES "E"
6" U.C. SERIES "C"

36" x 12" SUPPLEMENTAL TO MUNICIPAL & URBAN S1-1's
BLACK on YELLOW

**S1-1S**

NUMERAL WILL VARY WITH CROSSINGS INVOLVED (min 2 - max 9)

6" NUMERAL SERIES "C"
8" "X" SERIES "C"
6" U.C. SERIES "C"

36" x 12" SUPPLEMENTAL TO MUNICIPAL & URBAN S1-1's
BLACK on YELLOW

**S1-1S**

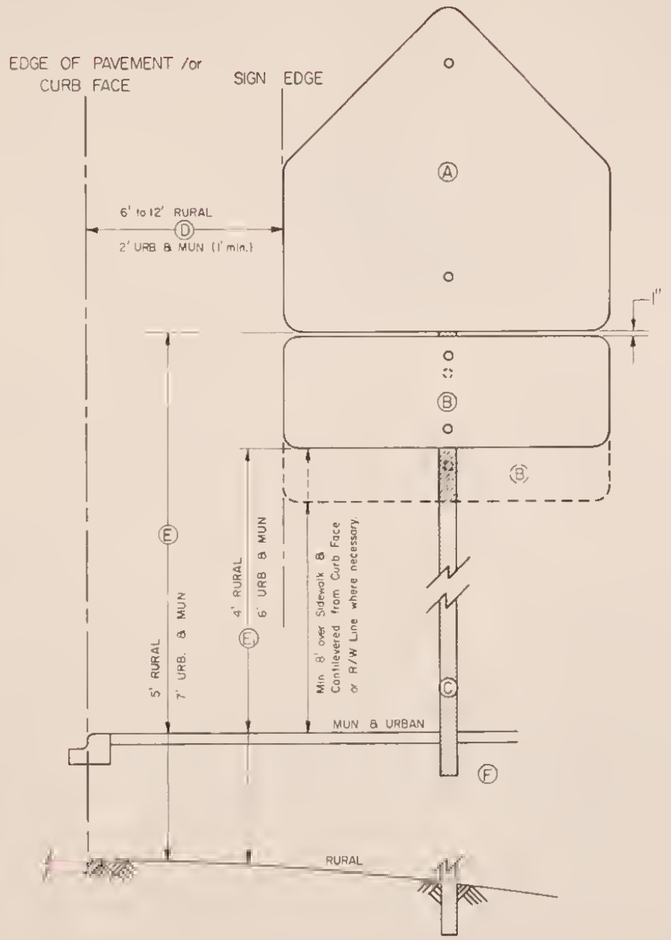
NUMERAL (FOOTAGE) WILL VARY WITH LOCAL CONDITIONS (min 200 FT - max 900 FT - S'd 800 FT)

6" NUMERAL SERIES "D"
6" U.C. SERIES "D"

36" x 12" SUPPLEMENTAL TO RURAL S1-1's
BLACK on YELLOW

IMPORTANT NOTE

INFORMATION CONTAINED HEREIN IS NOT THE LEGAL AUTHORITY FOR PLACEMENT OF SCHOOL CROSSING CONTROL DEVICES. THE DECISION TO USE SUCH CONTROL DEVICES SHOULD BE MADE ON THE BASIS OF A TRAFFIC ENGINEERING INVESTIGATION.




ELEVATION

LEGEND NOTES

| | |
|---|---|
| (A) | S1-1 School Advance Sign /or S2-1 School Crossing Sign (Sect 7B-9, 7B-10 of MUTCD) |
| (B) (B1) | S1-1S /or S2-1S Supplemental Sign (Sect 7B-1 of MUTCD) |
| (C) | Posts (Sect. 2A-27 of MUTCD) |
| (D) | Lateral Clearance (Sect. 2A-24 of MUTCD) |
| (E) | Heigth (Sect 2A-23 of MUTCD) |
| (E1) | " " " " " |
| (F) | Foundation (M.S.H.C. St'd Spec's) |

ALL SIGNS LISTED BELOW SHALL HAVE NON-REFLECTORIZED LEGEND AND REFLECTORIZED BACKGROUND.
S1-1
S1-1S (ALL)
S2-1
S2-1S

APPROVED H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY Josh R. Bischke
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 251

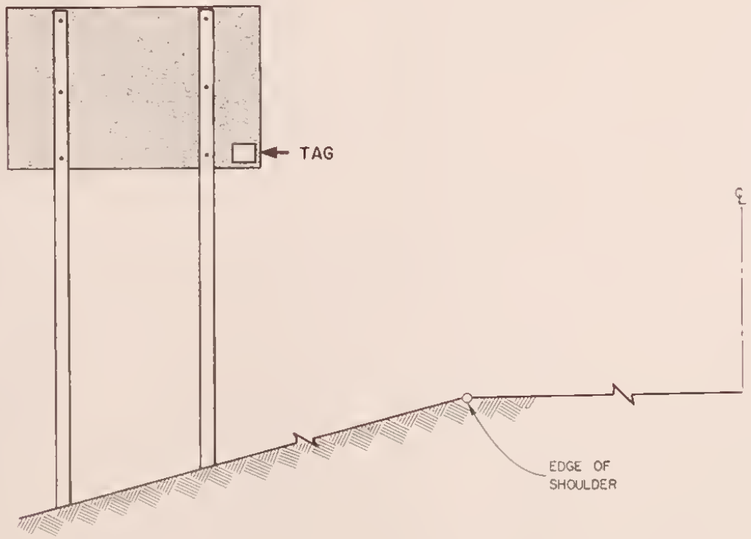
STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
SCHOOL CROSSING SERIES
SIGN DESIGN DETAILS

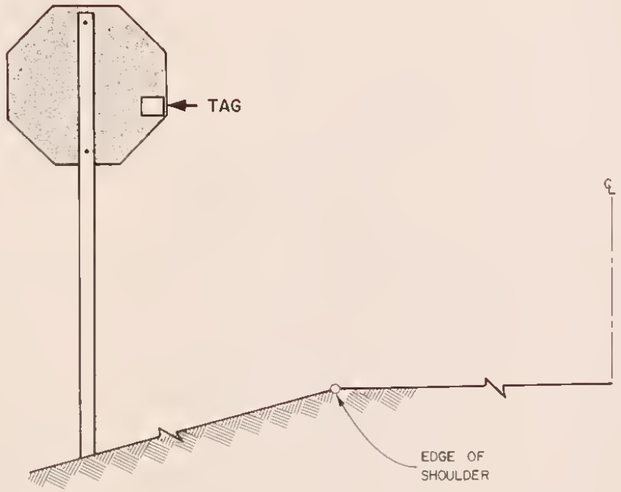
| | | |
|---|---|---|
| DRAWN BY: | 3-30-73 | G. E. G. |
| CHECKED BY: | 3-30-73 | G.A.J. |

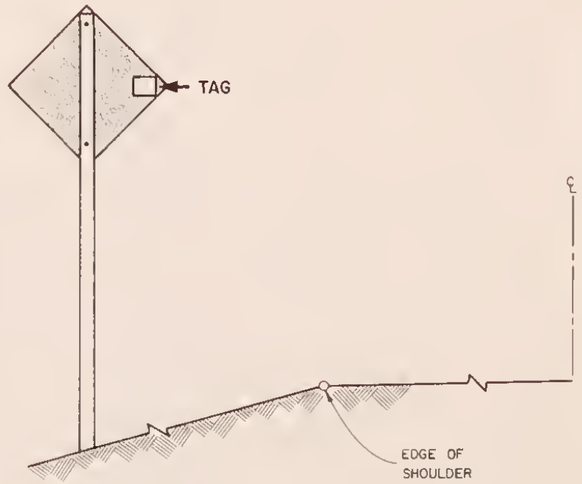
| | |
|---|---|
| REVISED | 10/16/74 |
| EFFECTIVE | 2/1/75 |

| STATE | PROJECT NUMBER | SHEET NO. |
|---|---|---|
| MONTANA | | |

# —INSTALLATION DATE TAGS—
# PLACEMENT DETAILS




NOTES:

1. In the case of a new Signing Project, the contractor shall place Installation Date Tags upon all signs before final acceptance of the Project. The cost for the labor to accomplish this work shall be included in the Sheet Aluminum and/or Aluminum Sheet Increment Items of the Contract. Tags are supplied by the state.
2. Tags shall also be placed upon any new sign which is installed in the field as routine maintenance.
3. The Tag shall display the year in which the sign was installed. The color for each years Tag shall be assigned at the beginning of the year by the Department of Highways Sign Shop in Helena, in order to make it easier to recognize the year of installation from the roadway.
4. The Tag shall be placed upon the back of each sign, located near the lower corner of the sign nearest the edge of roadway, and shall be visible from the roadway as shown in the examples (e.g.) above.
5. The Tags shall be available in the Divisions, either at the Division Maintenance Offices or the Division Construction Office. The Tags are made and can be ordered from the Departments Sign Shop in Helena.

| | | |
|---|---|---|
| DRAWN BY: | 3-30-73 | G. E. G. |
| CHECKED BY: | 3-30-73 | GAJ |

| | | | |
|---|---|---|---|
| REVISED | 10/16/74 | | |
| EFFECTIVE | 2/1/75 | | |

APPROVED: H. J. ANDERSON - DIRECTOR OF HIGHWAYS
BY: Jack R. Beckett
ADMINISTRATOR - ENGINEERING DIVISION

SIGNING
STANDARD DRAWING NO. 256

STATE OF MONTANA
DEPARTMENT OF HIGHWAYS
INSTALLATION DATE TAGS
PLACEMENT DETAILS

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